AUTOMOTIVE INDUSTRIES
The Automobile

Volume 69 — Number 2

Reg. U. S. Pat. Off.

JULIAN CHASE, Directing Editor

DON BLANCHARD, Editor

P. M. HELDT, Engineering Editor — JEROME H. FARRIS, Ass't Editor

JOSEPH GESCHELIN, Eng. Editor — ATHEL F. DENHAM, Field Editor

GEOFFREY GRIER, Art Editor

Contents

What Are Costs and How Will They Effect Equipment Sales? By Don Blanchard 31

Just Among Ourselves 33

Is A Turbine Torque Converter the Answer? By J. Jandasek, M. E., E. E. 34

Ford Patents Three Speed Planetary Gear 37

The Futility of Unemployment Insurance. By N. B. Keyes, Jr. 38

Sizaire Develops Wheel Suspension. By W. F. Bradley 41

Production Lines 42

Automatic Transmissions, Part 2. By P. M. Heldt 43

New Automatic Centrifugal Clutch and Planetary Transmission 44

Lubriplate for Gears Has High Pressure Characteristics 45

New Developments in Gear Lapping Increase Accuracy and Speed Production. By R. S. Drummond 46

S. A. E. Committee Presents Code of Size and Weight Limitations 49

The Forum 50

News of the Industry 52

Business in Brief 53

Automotive Oddities 57

Calendar of Coming Events 58

Advertisers' Index 36

Automotive Industries is published every Saturday by

CHILTON COMPANY

Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. — G. C. BUZBY, Vice-Pres.
A. H. VAUX, Secretary and Treasurer
JOHN A. CLEMENTS, Asst. Treasurer
GEO. D. ROBERTS, Advertising Manager

Cable Address ..... Autoland, Philadelphia
Telephone ..... Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 6-0080
Chicago—367 West Adams St., Phone Randolph 9448
Detroit—710 Stephenson Bldg., Phone Madison 2090
Cleveland—1140 Guardian Bldg., Phone Main 6860
San Francisco—1045 Sansome St., Phone Douglas 4306
Los Angeles—Room 651, 1206 Maple St., Phone Westmore 6477
Portland Oregon—72 Fifth St.

Controlled by United Publishers Corporation, 239 W. 39th St., New York; FRITZ J. FRANK, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, $1.00 per year; Canada and Foreign, $4.00 per year. Single Copies, 25c.

COPYRIGHT, 1933, CHILTON COMPANY

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

PJ FOR OVER A QUARTER OF A CENTURY PJ

THE PIONEER MANUFACTURER OF AUTOMATIC CHUCKING EQUIPMENT

POTTER & JOHNSTON MACH. CO.

PAWTUCKET, R. I., U. S. A.

Steam Cooling

PRACTICALLY ELIMINATES CRANKCASE DILUTION

Rushmore Laboratory

PLAINFIELD • NEW JERSEY

EXPANSION PLUGS

FOR CLOSING CORE HOLES

COILED and FLAT SPRINGS

PHOSPHOR BRONZE SPRINGS A SPECIALTY

SMALL STAMPINGS

WASHERS and SPRING COTTERS

WIRE SHAPES

M. D. HUBBARD SPRING CO.

620 SOUTH BLVD. PONTIAC, MICHIGAN

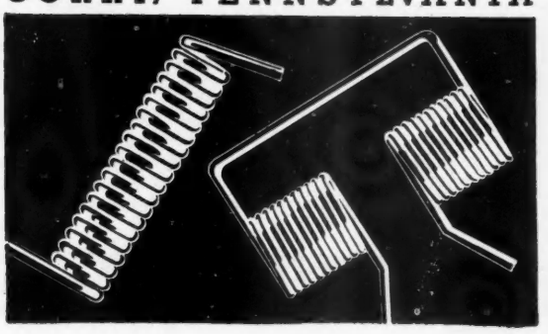
SPRINGS OF ALL KINDS

FLAT - SPIRAL - STAMPINGS - WIRE FORMS

RAYMOND

MANUFACTURING COMPANY

CORRY, PENNSYLVANIA



AUTOMOTIVE INDUSTRIES
The Automobile

Volume 69 — Number 2

Reg. U. S. Pat. Off.

JULIAN CHASE, Directing Editor

DON BLANCHARD, Editor

P. M. HELDT, Engineering Editor — JEROME H. FARRIS, Ass't Editor

JOSEPH GESCHELIN, Eng. Editor — ATHEL F. DENHAM, Field Editor

GEOFFREY GRIER, Art Editor

Contents

What Are Costs and How Will They Effect Equipment Sales? By Don Blanchard 31

Just Among Ourselves 33

Is A Turbine Torque Converter the Answer? By J. Jandasek, M. E., E. E. 34

Ford Patents Three Speed Planetary Gear 37

The Futility of Unemployment Insurance. By N. B. Keyes, Jr. 38

Sizaire Develops Wheel Suspension. By W. F. Bradley 41

Production Lines 42

Automatic Transmissions, Part 2. By P. M. Heldt 43

New Automatic Centrifugal Clutch and Planetary Transmission 44

Lubriplate for Gears Has High Pressure Characteristics 45

New Developments in Gear Lapping Increase Accuracy and Speed Production. By R. S. Drummond 46

S. A. E. Committee Presents Code of Size and Weight Limitations 49

The Forum 50

News of the Industry 52

Business in Brief 53

Automotive Oddities 57

Calendar of Coming Events 58

Advertisers' Index 36

Automotive Industries is published every Saturday by

CHILTON COMPANY

Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. — G. C. BUZBY, Vice-Pres.
A. H. VAUX, Secretary and Treasurer
JOHN A. CLEMENTS, Asst. Treasurer
GEO. D. ROBERTS, Advertising Manager

Cable Address ..... Autoland, Philadelphia
Telephone ..... Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 6-0080
Chicago—367 West Adams St., Phone Randolph 9448
Detroit—710 Stephenson Bldg., Phone Madison 2090
Cleveland—1140 Guardian Bldg., Phone Main 6860
San Francisco—1045 Sansome St., Phone Douglas 4306
Los Angeles—Room 651, 1206 Maple St., Phone Westmore 6477
Portland Oregon—72 Fifth St.

Controlled by United Publishers Corporation, 239 W. 39th St., New York; FRITZ J. FRANK, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, $1.00 per year; Canada and Foreign, $4.00 per year. Single Copies, 25c.

COPYRIGHT, 1933, CHILTON COMPANY

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

PJ FOR OVER A QUARTER OF A CENTURY PJ

THE PIONEER MANUFACTURER OF AUTOMATIC CHUCKING EQUIPMENT

POTTER & JOHNSTON MACH. CO.

PAWTUCKET, R. I., U. S. A.

Steam Cooling

PRACTICALLY ELIMINATES CRANKCASE DILUTION

Rushmore Laboratory

PLAINFIELD • NEW JERSEY

EXPANSION PLUGS

FOR CLOSING CORE HOLES

COILED and FLAT SPRINGS

PHOSPHOR BRONZE SPRINGS A SPECIALTY

SMALL STAMPINGS

WASHERS and SPRING COTTERS

WIRE SHAPES

M. D. HUBBARD SPRING CO.

620 SOUTH BLVD. PONTIAC, MICHIGAN

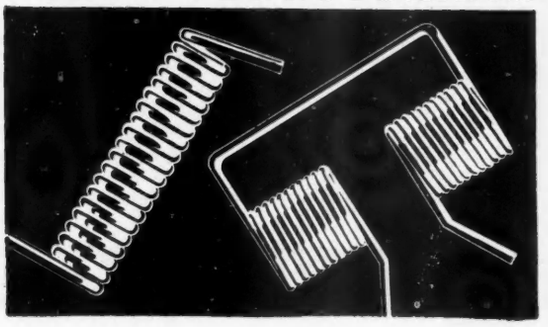
SPRINGS OF ALL KINDS

FLAT - SPIRAL - STAMPINGS - WIRE FORMS

RAYMOND

MANUFACTURING COMPANY

CORRY, PENNSYLVANIA



AUTOMOTIVE INDUSTRIES

Vol. 69, No. 2 • THIRTY-FIFTH YEAR • July 8, 1933

What Are Costs and How Will They Affect Equipment Sales?

by Don Blanchard
Editor, Automotive Industries

PRICE control of one kind or another affecting every element in the automotive industry may be just around the corner. Recovery Act plans now being formulated by the parts makers provide for it, while the tentative code developed by the National Automobile Dealers Association sets up a procedure for controlling used-car allowances. Although the N.A.C.C. has stated that its members do not seek price-fixing privileges for their own products, if the dealers' code is to mean anything, it is difficult to see how the car makers can keep away from it, at least to the extent of aiding in resale price maintenance. Moreover, the vehicle factories obviously have a vital interest in any price agreements which their suppliers offer for federal approval.

The practical application of the power over prices and practices which the Recovery Act makes it legal for the administration to grant, is not going to be simple. Moreover, if the administration of these powers is not to have effects not contemplated by the Act, there are sound reasons for believing that eventually some sort of vertical code will be imperative, at least for the industry's manufacturers.

Of course, the ultimate importance of many of the difficulties which can be foreseen now depends to a major degree on the manner in which the extremely flexible provisions of the Recovery Act are administered. This flexibility was provided so that both business and government would have room to move to meet unusual conditions as they arise, and the administration has given every indication that it intends to make use of the leeway it has been given to avoid injustice or undue interference with the established relationships of business. Consequently there is a good chance that many of the problems which now seem so knotty will find solutions in the give and take of discussion in conferences and at code hearings.

If the Government approves a code for parts makers putting the ban on sales below cost or at less than a fixed percentage above cost, what will be the effect on the extent of car factory purchases from outside sources? Whether the car maker buys a particular part depends, all things considered, on whether it is more economical for him to do so than to make it himself. Consequently, if the parts makers' efforts to rationalize prices, create employment, etc., under the Recovery Act, result in increased prices to the car maker, as they will, a tendency for the car makers to buy less and make more seems certain to develop—unless they are in turn subjected to control which will increase their costs in somewhat the same ratio as those of the parts makers. Similarly, unless there is some uniformity of control and practice throughout the manufacturing end of the industry, the more completely integrated car producers might gain

Possible changes in buying practices resulting from Recovery Act may make vertical code essential for benefit of workers throughout automotive group

substantial advantages over their less completely integrated competitors, who are more dependent on suppliers. Such shifts in the relations within an industry are not among the intended effects of the Recovery Act, and, while they can not be controlled entirely, a vertical code will not improbably be found essential to hold them in check.

That this is not an imaginary problem is indicated by the hearings on the cotton textile code. This code provides for the limitation of machine operations to 80 hours per week, equivalent to two 40-hour shifts. The "Big Four" tire companies, who make their own tire fabric, objected to this restriction on the ground that at the present time it was necessary to operate 144 hours weekly in order to produce enough fabric to meet the requirements of their tire factories. They contended further that enforcement of this provision would curtail production and employment in their tire plants as it would be impossible for them to get enough fabric to maintain operations at the present rate.

On the other hand, a number of smaller manufacturers who buy their fabric opposed any such exception. They pointed out that if the plants from which they buy their fabric were permitted to operate only 80 hours a week while the "Big Four" fabric plants were allowed to run 144 hours, fabric would cost them 25 cents more per tire, which would be an unfair discrimination. If an exception were made, they contended that they would be forced to produce their own tire fabric, which would mean that existing tire fabric plants would lose them as customers.

Some Knotty Problems

What the administrator's answer to this conundrum will be has not been revealed, but it does indicate the intricate and delicate nature of relationships which must be considered. The direct application of this case to the automotive industry becomes clear if, for example, we substitute an axle maker for tire fabric plant, and the car maker for tire manufacturer.

Another difficulty of a more obvious nature is the development of some fair and generally acceptable definition of the term "cost." If it were not for the time factor, uniform cost accounting might be expected to remove this difficulty. But unfortunately the formulation of a uniform classification of accounts, its general adoption, and the accumulation of sufficient data to provide a reliable basis of cost determination, are matters which require at least months, and more probably years of effort. Consequently, in the present emergency, uniform cost accounting does not offer a solution, although ultimately its adoption appears inevitable if cooperative control of prices is to be a permanent feature of our economy.

Cost Determination Methods

To meet the exigencies of the present situation, some short-cut method of cost determination will probably have to be worked out. In arriving at this short-cut method, arbitrary decisions will have to be made and individual manufacturers may be expected to be for or against these decisions, depending on whether they affect their competitive positions favorably or unfavorably. In the latter case, of course, rational defense of the proposal will be difficult or impossible because of the lack of fundamental factual data which uniform accounting would provide, if there were time to resort to it. In such cases the dissenting minority who see their competitive position being jeopardized will have to swallow their objections unless they can convince the federal administration that they are being discriminated against unfairly.

Of course it is to be expected that the car makers will exhibit more than passing interest in any short-cut method of cost determination that may be proposed. The consideration given to volume naturally will be of particular importance to them. It may be assumed, however, that the alleged practice of some suppliers selling both for original equipment and replacement, of quoting prices below cost will be brought to an end with the approval of any code banning sales below cost.

A procedure put forward by the well-known firm of accountants, Ernst & Ernst, gives a general outline of the kind of plan for cost determination that probably will have to be adopted temporarily if quick action is to be obtained. They suggest that: "An acceptable and ready basis for determining what will be 'cost' for checking and control purposes could be a standard, or model, or ideal, or budgeted cost—all terms meaning the same. This is based upon research and is a reflection of the figure at which goods can and should be produced in well managed plants operating at some accepted rates of plant capacity.

"Briefly, s t a n d a r d cost is a planned cost; it is one that is forecast as a definite goal toward which to work. It is not predicated upon past costs, but rather upon what cost should be—knowledge acquired by research in all of the factors that enter into cost. Management in its practical application of standard costs determines in advance:

1. The standard quantity of materials necessary to make the component parts that enter into each article.
2—The standard time allowance for the labor operations on each part or article.
3—The quantity of each article that will be made in a given period of time.
4—The extent to which its plant capacity will be used in the production of the articles within the time limits that are fixed for producing them.
5—The amount of services (expressed in dollars of expense) that should properly apply to the production in the period planned for."

Round Table Agreement

Adoption of a plan along these lines presumably would mean that the manufacturers would bring their cost records into a round table meeting where on the basis of experience they would reach an agreement as to reasonable cost of production. Assuming such procedure would be acceptable to the administration, it would work out most simply in industries where the products of participating manufacturers were comparable. This is not the case in the automotive parts business and its application therefore would be proportionately more difficult.

The major difficulty in cost determination, of course, centers in the handling of overhead, particularly under present conditions when there is so much unused plant capacity. On this point Dr. Walter N. Polakov, well-known management engineer, outlined recently a policy which the government might require industry to follow: He said, in part, "An indirect tax which would tend to drive idle machinery out of existence and make further investments in unnecessary plants and equipment unattractive to cap-

(Turn to page 44, please)

JUST AMONG OURSELVES

A Different Car Market

THE market which is returning to automobile manufacturers in 1933 may not be at all the same market which they lost in 1929. It is quite possible that the desires of the 1933-1934 buyer will be quite different from those of the 1929 buyer. What's more his needs may be different.

The people to whom the industry has sold cars during the depression may not be typical of the people to whom it will sell as prosperity returns. For three years now the workingman has been out of the automobile market. He had no job; he couldn't buy a car regardless of its price. When he gets a job again and comes back into the market will he react favorably to the same appeals? Will he want in a motor car the same things which he wanted back in 1929 when last he was a buyer?

* * *

May Favor Lowest Priced Cars

THESE aren't academic questions. Practical answers to them will spell success or failure for individual companies in the next two years. Executives recognize this fact. More than one has broached the subject to us; some are actively trying to predetermine the correct answers.

"The people who have been buying cars in the last three years," one executive said recently, "have been people who have had jobs even during the depression. They have had money and they chose to pay $50 or so more for a car which carried some luxuries which they desired. That's why the lowest-priced lines have not been the biggest sellers in any of the prominent makes.

"But we can't be sure that the depression-ridden worker will make a similar choice when he comes back into the market to buy transportation. True, there already are some indications that he will make just the same choice; but we can't be sure. He may want the lowest-priced individual transportation he can get." Paradoxically, business revival instead of business depression may bring minimum-cost motor cars into their own.

* * *

Consumer Research Needed Now

ALL of which means that never in the history of the industry was there more need for careful consumer research, honestly carried out and intelligently applied to engineering, sales and advertising problems.

This research needs to be consistent, continuous and comprehensive. Its general direction should be in the hands of the highest executive of the company.

Expenditure of too much money is scarcely possible, it seems to us, in *effective* consumer research at this time. Half a million spent in intelligent, *properly utilized* consumer research now may well prevent expenditure of $3,000,000 for dies to build unpopular designs; it may eliminate the need for an extra million or two in advertising to sell a fickle public an unappealing idea.

* * *

The Method Is Important

HASTILY conceived, directed toward confirmation of predetermined conclusions, or loosely or indifferently applied after results have been obtained, consumer research can waste money just as quickly as any other phase of the business—and more quickly than many.

The detailed technique of consumer research is extremely important. It requires the intense application of first-rate minds. It is capable of adding to existing merchandising waste if badly done. But it is capable of paying huge dividends if properly applied under the indeterminate market conditions which face the industry with the return of national prosperity.—N.G.S.

Is a Turbine Torque C

by J. Jandasek, M.E., E.E.

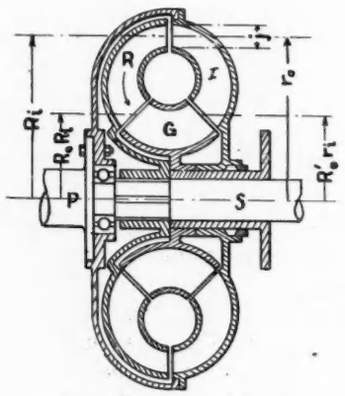


Fig. 1—Diagrammatic cross section of turbine torque converter

IN *Automotive Industries* of Sept. 12, 1931, I discussed the fundamental theory of turbine clutches and pointed out the chief advantages of these clutches. In spite of these advantages, the use of such clutches is still limited, which is probably due to the fact that in an automobile a turbo-clutch cannot replace change-speed gears, and for easy gear shifting either a mechanical clutch or a brake must be provided, which complicates the construction.

A logical step would seem to be to design a turbine torque converter for automobiles, and thus do away with change-speed gears and gear shifting, as well as with friction clutches and their operating mechanisms. For operation in traffic this would be an advantage for any passenger vehicle, and it would be particularly valuable in taxicabs, buses, and vehicles in such multi-stop services as house-to-house delivery. This is so, not only because the torque converter is automatic, so that the driver's hands are left free, but also because there are no clutch and gears to wear, which should keep down the maintenance cost.

It is of interest in this connection that the basic patents on turbo transmissions issued to H. Foettinger (U. S. Patents Nos. 1,199,359 to 1,199,364) will soon expire, which will leave the field free for improvement to inventors and engineers.

A turbine torque converter is a combination of a pump impeller, a turbine runner, and a stationary wheel, forming a fluid power transmission through which energy from a high-speed engine can be transmitted and by which the turning moment of the engine can be stepped up or down as required. Whatever the speed-torque characteristics of the source of power, the torque of the driven member varies automatically in accordance with the load on it, and its speed varies inversely as the torque. The principle of the device is illustrated in Fig. 1.

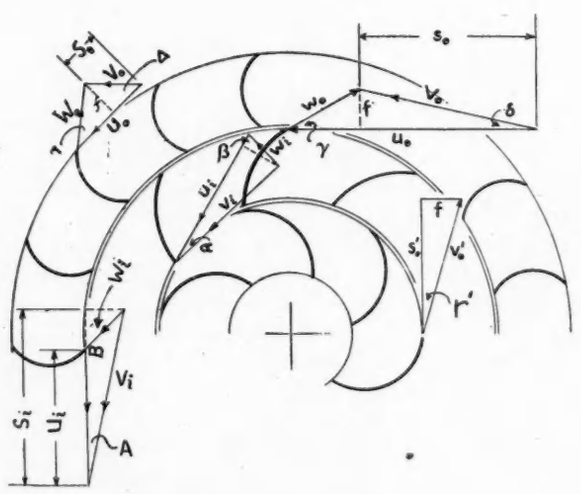


Fig. 3 — Relation between impeller speed and velocity of flow with 149 cu. in. engine

Fig. 2—Notation used in the mathematical discussion

Impeller *I*, mounted on a driving shaft *P*, delivers fluid into the turbine runner *R* mounted on the driven shaft *S*. The fluid set in rotation by the impeller impinges on vanes on the runner; after leaving the runner it enters the stationary guide vanes *G*, where its course is changed and its angular momentum increased, and it then flows into the impeller again, circulating continuously through the system.

When idling, the impeller does not deliver the fluid to the turbine at a sufficient rate, and the vehicle remains stationary. If the throttle is now opened, the speed of the engine and of the impeller is increased, and the latter delivers fluid

Converter the Answer?

With automatic transmissions in the spotlight, this article presents a timely analysis of the potentialities of the hydraulic turbine

to the turbine at a more rapid rate, thus starting the car. Any increase in the load at the road wheels slows the turbine and increases the difference between the speed of the turbine wheel and the pump impeller. This increases the velocity of flow, which in turn automatically increases the turbine torque and, therefore, the effective gear ratio. The turbine can be stalled by too much overload, but the engine cannot, being protected against overload by the guide vanes. At high speeds and light loads the turbine overruns, the same as the driven member of a gas-electric drive.

The transmission in itself comprises no reverse motion, and a separate reversing gear must be provided.

With turbo-clutches as described in the article previously referred to, it is impossible to get more than the direct engine torque on the driven shaft, because there is no point of torque reaction in the device, which consists of two parts only, the impeller and the runner. In the torque converter, however, the turning moment of the turbine can be much greater than that of the engine; the torque reaction is then also much greater, and the difference between the total torque reaction and that of the engine is taken on the guide wheel.

The function of the guide wheel is to impart additional angular momentum to the fluid whenever the turbine torque load increases. At light load the guide wheel absorbs unnecessary angular momentum from the fluid, and the turbine torque is then smaller than the impeller torque.

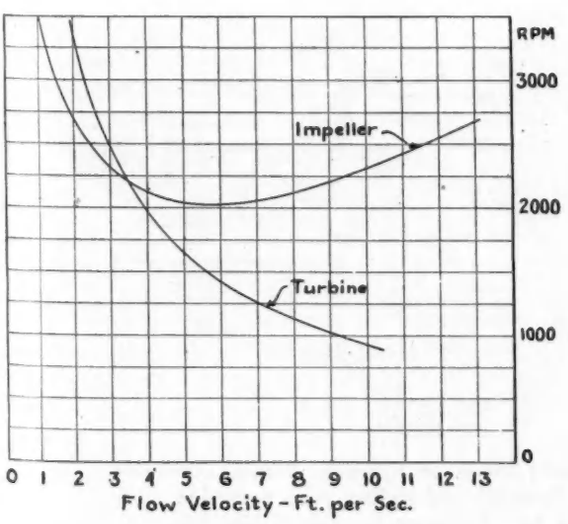


Fig. 4—Dependence of impeller speed and turbine speed on velocity of flow with 298 cu. in. engine

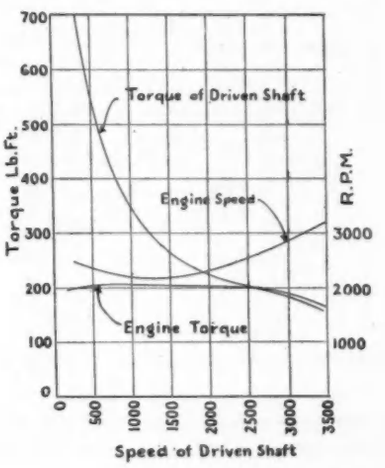


Fig. 5 — Relation between propeller-shaft speed, propeller-shaft torque, engine speed and engine torque for a car with eight-cylinder 3¼ by 4½-in. engine

Referring to Fig. 2, the following notations will be employed:
For the impeller:

- v = absolute fluid velocity
- w = relative fluid velocity
- u = linear velocity of a point on the impeller
- r = radius of this point
- s = tangential component of velocity v
- f = radial velocity of liquid
- j = width of channel
- k = weight of unit volume of liquid
- l = area of streams normal to f
- m = mass of liquid flowing per sec.
- n = r.p.m.
- t = torque
- e = energy

Subscript $_i$ refers to the stream at the inlet to the impeller; subscript $_o$, to the stream at the outlet. For the turbine the same notation

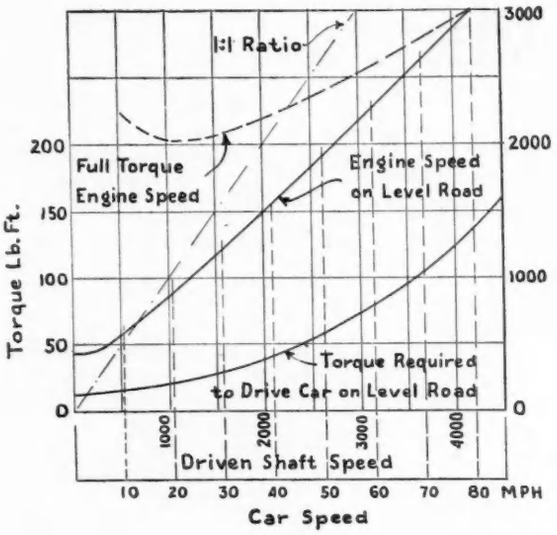


Fig. 6—Characteristics of a car equipped with an eight-cylinder 3¼ by 4½-in. engine and a torque converter

in capitals will be employed; for the guide wheel, the same notation in capitals with superscript ′.

It was shown in the article on the Turbine Clutch, and it can be found in any textbook on turbines, that the torque exerted by the impeller is

$$t = m\ (r_o s_o - r_i s_i), \qquad (1)$$

and the power imparted by the impeller to the liquid,

$$e = m\ (u_o s_o - u_i s_i). \qquad (2)$$

The torque available on the runner shaft is

$$T = m\ (R_o S_o - R_i S_i), \qquad (3)$$

and the energy transmitted to the driven shaft,

$$E = m\ (U_o S_o - U_i S_i) \qquad (4)$$

The additional turning moment created by the guide wheel is

$$T' = m\ (R'_o S'_o - R'_i S'_i \qquad (5)$$

Obviously, since there is no other means of generating or absorbing angular momentum or energy in the liquid circuit,

$$t + T + T' = O \qquad (6)$$

and

$$e + E = O \qquad (7)$$

Example:

What torque can be transmitted by the turbine torque converter illustrated in Fig. 2 when—

$r_i = R'_o = 5$ in. $r_o = R_i = 7$ in.
$n = 1800$ van angle $\gamma = 30$ deg.
velocity angle $\alpha = 7$ deg. $\Delta = 90$ deg.
$k = 62.4$ $f = 10$ ft. p.s. $j_o =$ 1.5 in.

The channel area then is

$l = \Pi \times 14 \times 1.5 = 66$ sq. in. = 0.458 sq. ft.

Rate of circulation of the fluid:

$lf = 0.458\ f$ cu. ft. p.s.

Rate of circulation in terms of mass of oil:

$m = 0.458\ f\ (62.4/32.2) = 0.886\ f$
$u_o = \Pi\ (14/12)\ (1800/60) =$ 110 ft. p.s.
$s_o = u_o - 1.75\ f = 110 - (1.75 \times 10) = 92.5$ ft. p.s.
$s_i = f \cot \alpha = 8\ f = 80$ ft. p.s.

The impeller or engine torque then is

$t = m\ (r_o s_o - r_i s_i)$
$= 0.886\ f\ [(7/12)\ 92.5 -$ $(5/12)\ 80]$
$= +\ 181$ lb.-ft.

If the calculated torque is greater than the torque of the engine to be used, either the value of flow velocity f or engine speed n must be diminished and the calculation must be repeated until the calculated torque corresponds to that of the engine.

In this way the diagram Fig. 3, showing the relation between the speed of an eight-cylinder, 3¼ by 4½-in. engine and the flow velocity, was constructed. Fig. 4 is a diagram of impeller and turbine speeds for a four-cylinder, 3¼ by 5½-in. engine. The turbine torque can be determined as follows:

As there are no vanes between impeller and turbine,

$S_i = s_o = 92.5$ ft. p.s.

Angle Δ being 90 deg., $S_o = O$

Then, neglecting short-circuit losses, the torque of the turbine

$T = +\ m\ (R_o S_o - R_i S_i)$
$T = -\ m\ R_i S_i = -\ 886\ f\ (7/12) \times 92.5$
$= -\ 476$ lb.-ft.

The guide wheel torque can be figured as follows:

As there are no vanes between the runner and the guide wheel

$$s'_i = S_o = O$$

and there being no vanes between the guide wheel and the impeller,

$$S'_o = s_i = 80 \text{ ft. p. s.}$$

The additional torque due to the guide wheels is

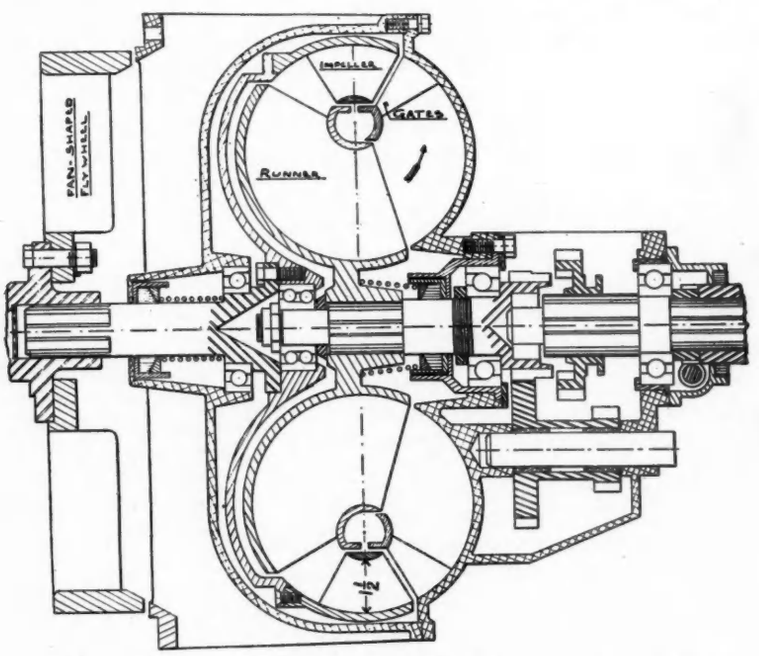


Fig. 7—This drawing shows an hydraulic torque converter, with fan spoked flywheel and sliding type reversing gear, designed by Mr. Jandasek for automobile use.

$T' = m\,(R'_o S'_o - R'_i S'_i)$
$= 0.886 \times 10 \times (5/12) \times 80$
$= 295$ lb.-ft.

We can now check equation (6):
$181 + (-476) + 295 = O$

The ratio of the turning moment (torque) on the engine crankshaft and that on the driven shaft in the example is therefore

$t : T = 181 : 476 = 1 : 2.63$

In this way the turbine torque can be calculated for any given engine speed, as illustrated in Fig. 5, which shows the engine speed and torque, as well as the turbine torque, plotted against the speed of the driven shaft. Fig. 6 shows the torque required to drive the car on level road and the corresponding engine speed plotted against car speed.

It is apparent from the chart that the engine has a tendency to overrun on level road, even at the lower speeds, and this is easily explained, because an eight-cylinder, 3¼ by 4½-in. engine has an excess of power for ordinary conditions.

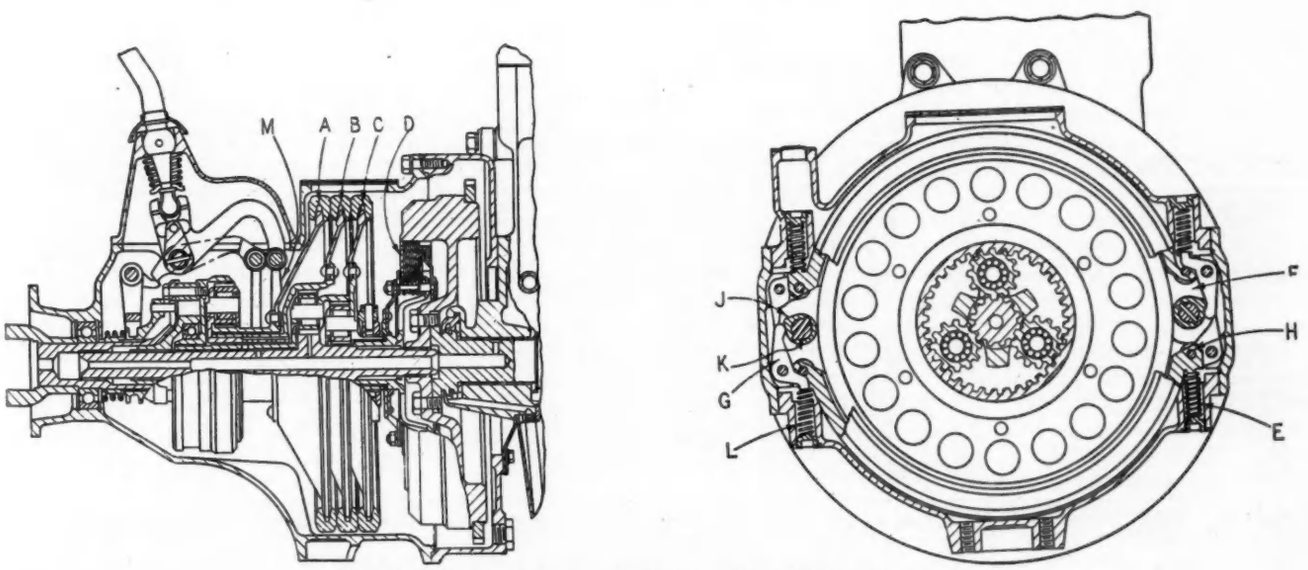
The advantages of the turbine torque converter may be summarized as follows: It gives a steady torque and smooth starting, and eliminates shocks and jerks, which means that it reduces the maximum stresses; with it the engine cannot be stalled; the converter is absolutely noiseless, and there is nothing to wear out; it does away with shifting of speed-change gears for forward drive, all forward speeds being controlled by the accelerator alone.

Ford Patents Three Speed Planetary Gear

FORD MOTOR COMPANY, LTD., of England, has recently patented in England a three-speed-forward-and-reverse planetary transmission which is controlled by the usual ball-mounted shift lever. The novelty appears to reside mainly in the form of the brakes and the means of their control. These brakes are of the metal-to-metal type with V-shaped braking surfaces. Each brake comprises two shoes located outside of the revolving member. The shoes are pressed against the drums by means of springs which are normally made ineffective by cams, the cams being controlled by the shift lever.

The illustration and the following abstract of the specifications are from the *Automobile Engineer*.

The various trains of epicyclic gearing are brought into action by the brakes, A, B and C, and the main clutch D. Not having to take the main torque, the brakes A, B and C are of light metal to metal construction. The construction of each is similar, the cross section illustrated being taken through brake B, where the disc has a natural direction of rotation towards the left. Each disc is formed with a V edge mating with the V grooves in two metal shoes, each of which is fitted with a roller at both ends. At the after end of each shoe is an energizing spring E normally held inoperative by a cam F. At the opposite end of each shoe is a lever G which positively engages the pivot pin H of the disengaging roller, and is operated by another cam J on the adjacent control shaft K. To prevent rattling a smaller spring L is fitted. Normally the four cams F engage the four rollers at the end of the shoes, and thus hold the shoes apart. Brake application is through the toggles M which simultaneously operate the two shafts K. The cams F slip away while the forward end of each shoe is pressed against the main disc by its lever G and anchored there. The after end of each shoe is held against the disc by its energizing spring E.



Planetary transmission patented by Ford Motor Co., Ltd.

The Futility of Unemployment

WITH practically every State legislature in session this year, it seemed highly improbable six weeks or two months ago that the deliberations of these bodies would close without leaving us a variety of legislative expedients for the intended purpose of unemployment relief. Tempered by the difficulty of financing such plans, and the fact that the federal government is taking more comprehensive steps in relation to industry than had generally been anticipated, the net result during the current year will, in all probability, be several additional commissions to study the subject.

Probably no phase of the depression has receved wider publicity or more consideration than unemployment. Since it has involved a substantial fraction of the population, it has necessarily caught the interest of the politicians throughout the country, who, under pressure of necessity and the despair that prevaled in the late winter, would most certainly have attempted to write into the statutes their varied conceptions of what constituted relief and prevention. Insurance, as an institution, having borne itself so commendably during the entire period of stringency, it is quite natural that it should apparently have embraced a magic from which the legislators desired to borrow.

It is rather unfortunate that some 20 years ago when England first attempted to meet her unemployment problems on a national basis she should have called her scheme unemployment *insurance*. An actuarial basis, predicated upon the experience of several of the important trade unions, was adequate, so far as reserves are concerned, however, this was true only so long as conditions similar to those under which the experience was obtained prevailed. The war and its aftermath threw England's entire business and social structure out of balance, and what was considered an insurable hazard proved to be an unpredictable contingency, a conflagration in human distress that fed upon its own flames.

The English experience, coupled with studies made by the best actuarial minds in this country, show conclusively that cyclical unemployment is not a satisfactory risk because there is no basis for prediction. Who could have predicted in 1928 or 1929 that in 1933 there would be 13,000,000 unemployed? Obviously, without a sufficiently accurate basis for predicting the risk, there is no actuarial foundation on which a plan of unemployment insurance can be built.

Seasonal unemployment is possibly insurable, and the condition of the English fund at the outset of the war would indicate that reserves for this phase of unemployment may be satisfactorily set up. Even then the contingency is so uncertain, and can so readily reach the calamity state, that it is not a satisfactory insurance risk. Consequently, the use of the word insurance in connection with schemes to mitigate unemployment distress is a misnomer. It is evidence of a partial knowledge of unemployment and of insurance, or is evidence of wishful thinking.

Foreign Financial Experience With Unemployment Insurance

Compulsory Systems	Date of First Legislation	Per cent Insured form of: Gainfully Occupied Persons	Per cent Insured form of: Total Workers	No. Insured	Workers in	No. of Beneficiaries during year	Per cent Beneficiaries Form of Insured	Total Payments into Insurance Fund	Total Expenditures for Insurance	Administrative Cost per Insured	Government Outlay per Insured
Great Britain	1911	63.5	75.0	12,290,000	1930-31	2,154,810	17.5	$317,368,000	$493,122,000	$2.52	$14.05
Australia: Queensland	1922	52.4	*	170,000	1929-30	55,903	32.9	2,387,000	2,519,000	0.66	4.68
Germany	1927	48.7	75.0	15,600,000	1930	2,158,049	13.8	427,947,000	428,318,000	1.85	11.13
Austria	1920	38.0	54.0	1,180,846	1930	208,370	17.6	21,924,000	29,189,000	1.51	8.91
Italy	1919	23.0	*	4,250,000	1929	230,000	5.4	9,141,000	3,817,000	.17	None
Irish Free State	1920	16.0	*	282,622	1929-30	16,237	5.7	4,639,000	2,273,000	2.41	4.31
Bulgaria	1925	12.0	*	.....	....	.....	....	.....	.....	....	....
Poland	1924	9.0	*	900,000	1930	53,319	5.3	5,379,000	12,738,000	1.13	1.99
Voluntary Systems								.....	.....	....	....
								726,000	726,000	*	0.24
Czechoslovakia	1921	28.0	40.0	1,733,979	1928	76,591	4.4	8,156,000	5,352,000	1.57	9.94
Denmark	1927	21.0	35.0	288,428	1929-30	119,956	41.6	.....	.....	....	....
Belgium	1920	20.0	25.0	.....	....	.....	....	4,114,000	3,327,000	0.27	4.17
Switzerland	1924	17.5	40.0	323,754	1930	73,941	22.5	4,449,000	3,263,000	0.44	4.11
Netherlands	1916	16.0	35.0	450,000	1929	48,395	10.8	41,400	18,800	0.08	.11
Finland	1917	5.0	*	68,633	1928	2,778	4.0	431,000	352,000	1.81	5.31
Norway	1915	3.3	*	36,000	1929	5,900	16.4	.....	.....	....	....
France	1905	1.5	*	.....	....	.....	....	.....	.....	....	....
Spain	1931	Not Operating									

* Data not available. Note: Except in case of Italy, all governments above contribute together with workers and employees. In Italy workers and employers alone contribute.

Insurance

By N. B. KEYES, JR.
Social Insurance Editor, The Spectator

Foreign experience proves that cyclical unemployment is not an insurable risk. Industry's obligation to direct probable law making along nine practical lines. Developments in State Legislation for unemployment relief

The fundamental purpose of insurance is too often misconstrued. Insurance is a business and not a philanthropy. Certain of the State laws at the present time do not permit insurance companies to underwrite the risk of unemployment, and the interest of the insurance companies in this subject is probably best summed up in testimony offered by Mr. Roderic Olzendam, Social Insurance Research Director of the Metropolitan Life Insurance Company, in his appearance before the Joint Legislature Committee on Unemployment of the State of New York, when he said, in reference to legal restrictions mentioned above: "As far as I am informed, there are no insurance companies today which would advocate any change in the law which would make it permissible for them to experiment with unemployment insurance. So far as our own company is concerned, we have definitely concluded that, on the basis of our studies during the past two years, we certainly would not now be willing to undertake such an experiment."

It is improbable, however, despite the fact that the insurance companies feel that unemployment is not an insurable risk, that the desires of several million vitally interested Americans will permanently go without legal attention by our legislators.

One has merely to see grouped together the masses of printed information in the form of suggestions, plans, testimony and reviews of European schemes to realize that the subject of unemployment benefits is a ponderable question fraught with difficulties, and as yet without any simple formula for its solution. European plans have, on the whole, been quite unsatisfactory and inadequate. They show fundamentally that, while they may relieve stress, they do not alter the causes which produced the effect, and very definite testimony may be discovered proving that they have a tendency to promote further unemployment.

There are two distinct types of involuntary unemployment. The first is seasonal and is, or should be, largely the problem of management in the industries in which it may be said to be chronic. It is not necessarily a contagious or dangerous form. The other—cyclical unemployment—is a highly infectious economic disease, the result of a wound or serious maladjustment. This is both contagious and infectious, being contagious in a psychological sense, in that it tends to break down confidence; and infectious in the sense that the reduced buying power of the first to feel the sting of unemployment is rapidly transmitted throughout the economic body.

It is unfortunate that so little is generally known about the causes of unemployment. In the case of seasonal unemployment they revolve largely about the demand for goods, either real or stimulated. It is difficult to see how these causes, which are well known to management, can be more statisfactorily controlled and regulated by legislation than by management itself. In certain industries manufacturing standardized goods such as soap, men's hats, or quasi-monopoly products, astute management has already been able to reconcile the differences in the production and the consumption curves, and, in a few industrial organizations, guarantee their employees a considerable measure of employment stability.

These plans, which were set up to meet seasonal unemployment, must not be dismissed simply because they are few in number and involve thousands rather than millions of employees. They have a rightness of direction, a putting of first things first, that demands fullest consideration. They attempt to prevent, rather than to subsidize. They are the logical approach to the unemployment problem.

When the various statutes, regarding workmen's compensation, were once in effect, the cost of that form of insurance soon brought about a widespread Safety First Movement. It became immediately apparent that it was less costly to prevent than to indemnify. With this experience in mind, it would seem prudent that, whatever is

done on the score of unemployment, should be done primarily with an aim to prevention, allowing indemnity to follow when and as preventive measures prove inadequate. In the vast array of unemployment benefit schemes now being proposed, the majority have this same fault, they deal with effects, without direct strokes at the causes. It is unthinkable that we must progress toward the desired objective by a round-about method.

Obviously, something really constructive must be done about unemployment. The automotive industry has but to compare its production schedules for the last five years to realize its influence. It is improbable that we will pass through the next decade without a considerable amount of social legislation. The past two months have been very illuminating in this respect. It is well, therefore, to face frankly the advent of such legislation and attempt to turn it into the most useful channels. Does it not seem reasonable that industry should lend its efforts to directing this legislation to constructive ends? Is it necessary for us to follow the legislators of Europe along the one-way roads which they have traveled, and into the morass in which they find themselves?

Provisions of Wisconsin Law and Recommendations of Commissions on Unemployment Insurance Which Have So Far Reported

	Wisconsin Law	Interstate Commission	New York Legislative Committee	Ohio Commission	Massachusetts Commission	Connecticut Commission	American Federation of Labor
Coverage.	Employers of 10 or more persons. Employees receiving less than $1,500 annually.	Employers of 6 or more persons. Employees receiving less than $200 monthly.	Committee urged "establishment as soon as a plan can be perfected of a compulsory state-wide system of unemployment reserves."	Employers of 3 or more persons; employees receiving less than $2,000 annually.	Employers of 10 or more persons;	Employers of 5 or more persons earning $2,000 or less.	Same as workmen's compensation.
Exclusions.	Farm labor, personal and domestic service, public employment, interstate transportation.	Farm laborers.			Agriculture and domestic service.		Same as above.
Contributions.	Employers only.	Employers only.		From both employers and employees.	Employers only.	Employers for 1st 13 weeks. After that employers and employees.	Employees only.
Rate of Contributions.	2% of annual payroll until reserve per employee is $55, then reduced to 1% until reserve is $75. Nothing after that.	2% of annual payroll; 1% for average employee reserve of $50 - $75 and no payment when reserve per employee is $75 or over.		2% of annual payroll by employer, 1% of wages by employee.	2% of annual payroll; reduced to 1% when reserve of $50 per employee is reached and to nothing after $75 is reached.	2% of payroll until $50 reserve per employee is reached; then 1% until $75; after that, nothing.	3% of total payroll.
Waiting period.	Two weeks.	Not specified.		Three weeks.	Four weeks.		
Benefits	$10 per week or 50% of average weekly wage, whichever is lower; benefits may be reduced in amount or duration if employer's fund is unable to meet full payments.	Substantially same as Wisconsin.		50% of average weekly wage with maximum of $15.	50% of average weekly earnings with maximum of $10.	Not more than $10 per week. Dismissal after 13 to 39 weeks. $10 for 2 weeks only. After 40 weeks full benefits.	As much as fund status permits.
Maximum duration of benefits.	Ten weeks in year.	Ten weeks in year.		Sixteen weeks in any twelve consecutive months.	Ten weeks.	Twelve weeks.	As long as fund status permits.
Administration.	By state industrial commission.	State industrial commission or special state unemployment commission.		State unemployment commission.		State Board of Industry.	Administered by state.
Eligibility for receipts.	No payment for unemployment due to misconduct, voluntary quits, trade disputes or refusal to accept "suitable employment."			Contributions for 26 weeks for year or 40 weeks during 2-year period.	Restricting benefits to those employed more than 8 weeks.	40 weeks of continuous employment, employees completing 13 weeks of employment or less than 40 weeks.	Practically no restrictions as long as unable to secure employment for which "reasonably fitted."
Nature of Fund.	Separate fund for each employer.	Separate fund for each company.		One fund for all companies.	Each company accumulates and maintains own reserve.	One fund for all companies.	One fund for all companies.
Exemption from Contributions.	Companies guaranteeing 42 weeks' work in year or having a plan approved by the commission.				Permission for companies to establish their own plans.		

Industrial legislation now being considered seems to embrace promising possibilities. Whether it will provide the working basis on which we can solve all our industrial ills remains to be seen. It is at least a beginning, and apparently in the right direction.

We cannot expect, and certainly should not hope that legislation will provide the full cure. Management still has its responsibilities in regard to unemployment, and enlightened management will continue to shoulder this responsibility. If its activities can be made more secure it will be rewarded by loyalty and increased efficiency from its employees.

Among the many plans and proposals for unemployment relief we find those for the setting up of employment reserves by employers alone, or by employers and employees together, which are designed to provide partial protection against unemployment on a non-actuarial basis. Such reserves have been built up by a number of companies in the United States and it is interesting to note that, out of 20 plans of this kind which went into effect from two to seven years ago, seven had been discontinued by Jan. 1, 1933. These 20 plans are analyzed in a report, "Essentials of a Program of Unemployment Reserves," which has been published by the National Industrial Conference Board and should be read by every automotive executive.

According to the report of the National Industrial Conference Board, referred to above, the outstanding legislative developments in the field of unemployment insurance have been:

1. The enactment of a compulsory law—first in this country—by the State of Wisconsin.
2. The report of the Inter-State (New York, New Jersey, Massachusetts, Pennsylvania, Ohio and Connecticut) Committee on Unemployment Insurance advocating legislation similar to the Wisconsin Law.
3. The preliminary report of the New York Joint Legislative Committee on Unemployment.
4. The report of the Ohio Commission on Unemployment Insurance.
5. The report of the Massachusetts Commission on Stabilization of Employment.
6. The report of the Connecticut Unemployment Commission.
7. The submission by the California Commission of a lengthy report and a bill similar to the recently adopted Wisconsin Law.
8. The declaration of the A.F.L. in favor of compulsory State unemployment insurance.
9. The creation of commissions to investigate unemployment insurance by Illinois, Louisiana, Oregon, Pennsylvania and Tennessee.

A table summarizing the provisions of the Wisconsin Law, the recommendations of the commission which have so far reported, and the plan of the A.F.L., is here presented.

Sizaire Develops Wheel Suspension

by W. F. Bradley

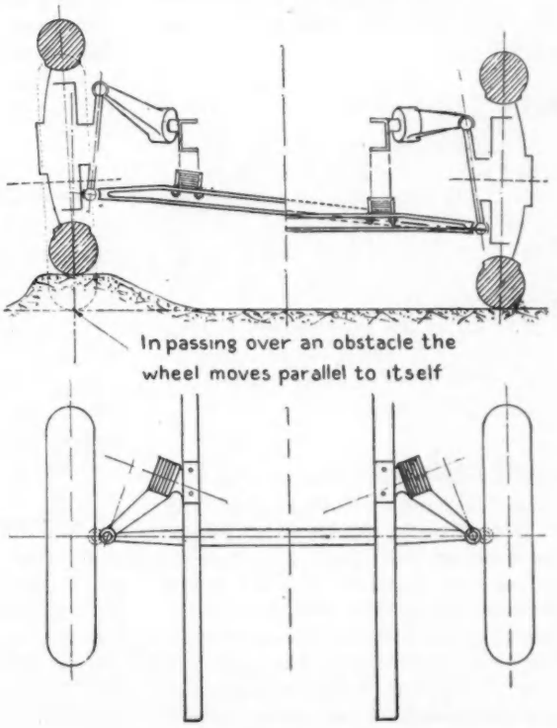
MAURICE SIZAIRE, the engineer responsible for the Sizaire - Naudin automobile, which had independently sprung front wheels in 1905, and of the Sizaire-Berwick car, which had four independently sprung wheels, has produced a new type of suspension which he calls "semi-independent." An option for the use of this suspension has been taken up by Citroen, which is experimenting with it at the present time.

Maurice Sizaire makes use of a straight axle, to which springs are secured by clips in the usual manner. At each end of the axle there is a ball-and-socket joint to which the steering pivot is attached. At the upper end of the pivot there is a second ball-and-socket joint which is connected to the chassis frame member by means of an arm, which can be made use of as a shock absorber.

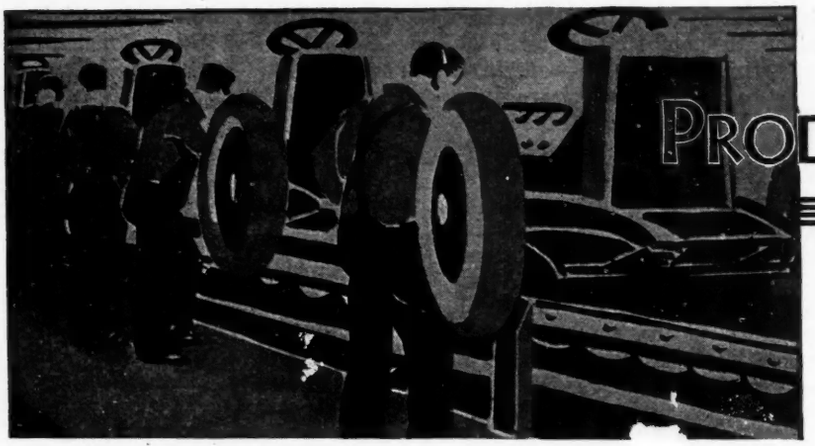
The construction between the frame member and spring on the one hand and the steering knuckle on the other forms a sort of parallelogram. It is not a geometrical parallelogram, however, for the upper arm pivots around a center which is mounted obliquely in relation to the frame member, the angle between frame member and arm being about 60 deg.

With this construction the axle is really a beam acting as a distance piece between the two front wheels; it has the advantage, however, of giving the transverse rigidity of the usual type of suspension, and of preventing the car from rolling on bends.

When riding over an obstacle, the wheels always remain parallel; gyroscopic forces are eliminated, and wheel wobble and shimmy are abolished, it is claimed.



Diagrammatic views of Sizaire's semi-independent suspension as applied to front wheels.



PRODUCTION LINES

What, No Springs?

Has anyone done anything about rubber or latex molded seats and seat backsé A reader asks the question in which we join as an interested party. Rubber upholstery is a British development described in *Automotive Industries* about two years ago. It presents an attractive field of experimentation. The construction does away with springs, metal frames and whatnot.

An Orchid

Advertising & Advertising Arts, May, 1933, devotes a section to the commercial art that drew the plaudits of the 1932 Art Directors' Show. Among the medallists is Alexey Brodevitch. His hit was the long sleek roadster exposing innards of zinc die castings. It was designed for the New Jersey Zinc Co., and was used in their advertising in *Automotive Industries.* Are we proud?

Add Safety

Lycoming belongs on the safety honor roll printed on this page recently. During 1932 the plant operated 2,527,121 man-hours with a frequency rate of 3.56 and a severity rate of 0.215. Only 9 lost-time accidents in 1932.

Murray Body too! Severity rate in 1930—1.8, 1931—1.47 1932—0.96. That's for a body plant employing 3,776 men.

Front Ends

An ingenious machine designed by U. S. Rubber yields some striking dope on the effort required to steer a car. It claims that the effort increases from zero to a maximum with the car at rest on a pavement. The maximum seems to be reached when tire and wheel have been turned through an arc of 11 deg.

Sliding Doors

Henry Dreyfuss, dyr nic industrial designer with decidedly practical turn of mind, asks us whether body designers have thought on the idea of using sliding doors for auto bodies. He is thinking of a construction which would permit doors to slide unobstrusively into a recess, when you or I press a suitable button. Would do away with all exposed hardware, eliminate accidental door breakage, and all that. It may take some heavy thinking to work it out. But it's an idea worth testing.

What Price

Is it possible that the hectic drive to beat down machine tool prices has jeopardized the profit possibilities of certain factories? That it has, seems to be evident from a story we got the other day. Some scalps may be lost when the day of reckoning comes. You just can't buy production equipment on price alone. Not when the pace is so hot.

Advanced Welding

July 10 is the date set for the next advanced welding course at the John Huntington Polytechnic Institute, Cleveland. It is designed to give engineers and experienced operators a week's intensive study from both the practical and theoretical standpoint. A feature of the course is the welding of alloy steels and non-ferrous metals.

Universal Grinder

Landis Tool tells more about their Hydraulic Universal Grinder in a descriptive booklet, L-33. Add this to the dope you clipped out of *Automotive Industries* when this machine was first put on the market.

Leads Parade

Hear that a large automotive steel buyer is working with the mills on the development of a new and better alloy. We don't know what it is but it's going to be good. Just another bit of evidence of the increasing use of fine alloys in the automotive industry. The industry leads the parade in the usage of finer, more expensive materials.

Letter Perfect

More information for production men on the welding of various stainless steel alloys now on the market. This from welding headquarters, *Oxy-Acetylene Tips* for June. General recommendations for gas welding include clean surfaces, a neutral flame except where specified, and the use of a flux possessing special characteristics as Chromaloy.

Die Casting

If you are thinking about zinc alloy die castings ask us about physical properties and electroplating. Don't let bright plating worry you. A practical technique has been developed and is available. Are you familiar with the new alloys which possess good physical properties and resistance to aging? We can get the facts for you.

Synthetic Finish

Commercial bodymakers are promised great things by the manufacturer of a synthetic finish. If their experiments mean anything, it should be possible to cover the body with only one coat sprayed right on the clean metal surface. It would be a superfluity on our part to comment on the possible savings in finishing costs thereby.

—J. G.

MANUFACTURING MANAGEMENT METALLURGY

The second of a series of articles dealing with some of the fundamental problems underlying the design of automatic speed changing devices to meet the conflicting and changing requirements of operation

by P. M. Heldt
Engineering Editor,
Automotive Industries

AUTOMATIC TRANSMISSIONS

Engine Torque as a Means of Shift Control

Part 2

CAN engine torque or torque reaction be made to control an automatic transmission? This question undoubtedly would have been answered in the negative some years ago when it was considered necessary to bolt engine blocks down rigidly to the car frame. Today we know that power plants may be mounted on the chassis in such a way that they will rock through a considerable angle under the influence of changes in engine torque. If the engine moves angularly as the torque load on it varies, it would seem to be possible to cause it to change gears, engage friction clutches, or change the setting of a continuously variable transmission.

There is another difficulty, however, which on first thought seems to make it impossible to utilize the engine torque for this purpose. This lies in the fact that when the engine is at rest it must be disengaged from the driving mechanism in order that it may be cranked by the electric starter without too heavy a current draw, or even by hand in an emergency. But if the engine is disconnected from the drive there is no torque load on it. However, if the throttle were opened suddenly, a momentary torque impulse would result from the inertia of the flywheel, crankshaft, etc., and the engine would be deflected from its position of rest. This yield of the block under inertia-torque might be used to engage the friction clutch of the low gear. But since this torque impulse persists for a short time only, the operation of engaging the gear in this manner naturally would be somewhat delicate.

Assuming that the low gear has been engaged in this way, it will not be long before it becomes desirable to change to high gear. Now, in order that the low gear may be engaged first when the car is being started, its clutch must be so arranged that a comparatively small torque reaction of the engine will engage it, while the high-speed or direct-drive clutch must require a heavier torque and greater angular displacement of the engine for its engagement.

Right here we run up against another difficulty. It is obvious from the conditions just outlined that when the car is being started, the throttle cannot be opened wide immediately, or the engine would almost immediately engage the high gear. There is an important difference between the speed and the torque of the engine in this respect; it takes time for the engine to run up to its maximum speed, because of the heavy masses which it must accelerate, but if the engine is at normal temperature it develops its full torque as soon as the throttle is opened. It will thus be impossible to accelerate the car in low gear to any considerable speed. A certain fraction of the torque range (or throttle range) must be reserved for the high gear and the remainder for the low gear. This evidently would place the car at a disadvantage relative to a hand-controlled one, as the latter can be accelerated under full throttle in low gear up to the car speed corresponding to normal engine speed, or at least to that engine speed at which the high gear begins to give greater acceleration than the low gear.

While the engine is being accelerated in low gear, if the throttle is kept in the same part-open position, the engine torque does not increase with the speed, but, on the contrary, decreases as the speed increases. Therefore, the higher engine torque necessary for engaging the high speed gear can be obtained only by continuing to open the throttle as the car gathers speed, and perhaps snapping it open quite rapidly over the last part of its range, so that inertia will help to increase the torque load and the angular deflection of the engine block.

There would be a constant tendency for the transmission to slip back into low gear as soon as the traction resistance decreased, which is exactly the opposite of what is wanted, for with low traction resistance the engine can

readily handle the car in high gear, and in this gear the wear and tear on the engine and the fuel and oil consumption will be a minimum.

The foregoing considerations indicate that automatic control of transmissions by engine torque is not very promising. If effected in the manner described, not only would it cut down the average acceleration of the car by making it impossible to run in low gear with the throttle well opened, but it would cut down the economy by making it impossible to run in high gear when the traction resistance was low.

These objections might possibly be overcome by providing an additional control device which enabled the driver to change at will the engine torques at which the different clutches engaged. In that case, however, there would be the same number of control elements as at present, the transmission ratio would still be changed in steps, and little if anything would be gained. Control by engine torque therefore is not promising.

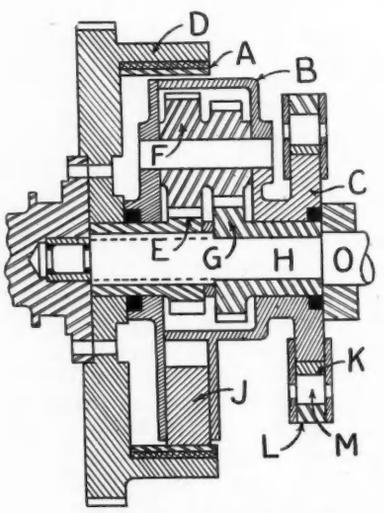
New Automatic Centrifugal Clutch and Planetary Transmission

A TWO-SPEED planetary transmission in which changes of gear occur automatically has been invented by R. C. Berry, president of Klaisler-Berry Engineering Company of Indianapolis. A sectional view of the transmission is shown herewith. A centrifugal clutch *A* is mounted on the planetary-pinion carrier *B* with which latter a unidirectional brake *C* is rigidly connected. Brake *C* is applied by the accelerator pedal. When pinion-carrier *B* rotates, the bands *A* of the centrifugal clutch are pressed against the inside of clutch drum *D* (part of the flywheel) by the centrifugal force on clutch weights *J*.

To start the car, the operator presses down on the accelerator pedal, thereby setting the brake *C* and holding pinion-carrier *B* stationary. The drive then is from pinion *E*, which is rigid with the engine crankshaft, through gears *F* to gear *G*, which latter is secured to the main drive shaft *H*. If the driver now lifts his foot from the accelerator pedal the brake *C* is freed, the momentum of the car sets pinion-carrier *B* in motion, and the resulting centrifugal force on clutch weights *J* presses the clutch band *A* against the inside surface of clutch drum *D*, thereby locking *D*, *A*, *B*, *F*, *G*, and *H* together as a unit which acts as additional flywheel weight. If the accelerator is now pressed down again the unidirectional rotation of the brake drum frees the braking action of C automatically.

When the load becomes too great to pull in high gear, the engine slows down, clutch bands A are pulled out of contact with clutch drum *D*, and pressure on the accelerator pedal again locks brake *C*, thereby reengaging the low gear.

The unit described can be used in conjunction with a standard three or four-speed transmission and then gives six or eight forward speeds. If the unit is used without the usual transmission it must be combined with a reversing gear which can be operated by a lever on the dash. The car can be operated in low gear at all engine speeds, and once the change to high gear has been made it will remain in high gear until the load becomes too great for the engine to pull in any particular throttle position or until the engine is stopped.



Sectional view of the Berry automatic transmission

What Are Costs And How Will They Affect Equipment Sales?

(Continued from page 32)

ital can be imposed under the law. The administrator could refuse to recognize carrying and other charges on idle equipment as a legitimate part of operating expenses.

"A plant with 100 machines, 50 of which are idle, has no more right to include the expense of owning the idle machinery in the price of its finished product than has the owner of a two-family house to charge double rental to one tenant because his other apartment is vacant."

Whether or not the government adopts this viewpoint, the industry is going to have to face this problem in arriving at a basis of cost determination. Some decision will have to be made as to whether all, part or none of the cost of unused plant capacity is to be included in the standard cost. Just where the line is drawn obviously means much to the individual manufacturer. Moreover, this decision may conceivably result indirectly in the elimination of some of the industry's surplus capacity, whether or not the government has this objective in mind in shaping its policies under the Recovery Act.

Renewed emphasis on efficient production appears to be another probable consequence of a prohibition against selling below cost or some fixed percentage above cost. This prohibition will add to the existing pressure to get costs down and will probably lead to the installation of considerable new equipment. This tendency will be accentuated further by rising labor rates.

Resists Corrosion and Has Greater Strength

BRIDGEPORT BRASS CO., Bridgeport, Conn., has recently issued a booklet on its Duronze, a non-ferrous metal largely employed where strength must be combined with corrosion-resisting properties. It comes in three grades, Duronze, Duronze II and Duronze III. Duronze III is much used for marine work, such as propeller shafts, pump rods, gears and pinions. A Duronze gear or pinion is claimed to outlast fiber or steel against a steel gear. Such gears and pinions are cut from hot forged blanks.

Lubriplate for Gears Has High Pressure Characteristics

AFTER about two years of extensive work on industrial lubrication and some automotive applications, the Lubriplate Corp., New York, N. Y., is extending the use of Lubriplate to the wide variety of automotive lubrication problems. Lubriplate, as is well known to our readers, is the trade name for a line of lubricating oils and greases containing finely divided metallic zinc which is thoroughly dispersed in the lubricant.

Under operating conditions, the zinc plates out on the load-bearing metal surfaces in a thin, protective and wear-resistant coating. It is claimed that the coating is atomic in thickness and does not build up further, thus making it safe to use on bearings and other mating parts having precision fits.

One of the most interesting applications of Lubriplate is its use as an E-P lubricant for free-wheeling transmission units and rear axles. It has been applied on hypoid gearing and worm drives, in the latter case, only the worm being plated as the zinc does not deposit on the non-ferrous material.

This lubricant is available in two forms—fluid and non-fluid—in accordance with the following specifications:

Fluid Lubriplate

No. 5—A light free flowing oil of 60 Saybolt seconds at 100 deg. F.

No. 10—Viscosity 90 Saybolt seconds at 100 deg. F. and a pour test of ten degrees below zero. It is recommended especially for small enclosed gears operating at high speeds and temperatures, free-wheeling and synchro-mesh transmissions in automotive equipment.

No. 20—Viscosity 200 Saybolt seconds at 210 deg. F. and a pour test of five degrees below zero. Due to its high film strength, it is used for the conventional type of automotive transmissions, differentials and hypoid gears. It is also used extensively for drawing of metals.

No. 25—Viscosity 260 Saybolt seconds at 210 deg. F. with a pour test of zero. Although heavier than No. 20, this density possesses practically the same characteristics. It is recommended for heavy duty plain and anti-friction bearings, worm drives, open and enclosed gears, chains, etc.

Non-Fluid Lubriplate

Lubriplate non-fluid lubricants are made up in two distinct types of three densities each. The *one hundred* series, namely 105, 110 and 115 compare as to light, medium and heavy. Likewise the *two hundred* series, Nos. 205, 210 and 215, as to light, medium and heavy densities. All non-fluid Lubriplate is white in color and stays white in use.

Gear lubricants Nos. 10, 20 and 25 have extreme pressure characteristics and are said to be suitable for year round operation.

Lubriplate is being used extensively for chassis lubrication where it is said to be particularly effective because of its waterproofness. Chassis lubrication with this system is said to be good for at least 2000 miles.

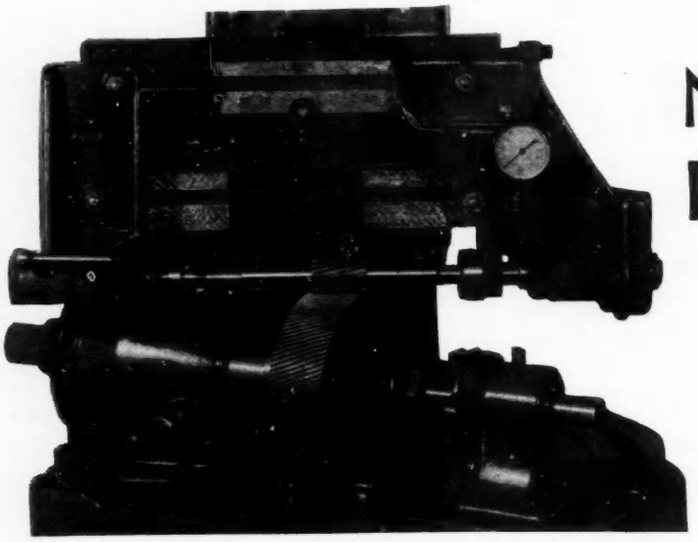
Another application that should be of automotive interest is that of lubricating industrial machinery and conveyors, particularly in places difficult to reach and in general where freedom from corrosion is desirable.

Production At a Glance

AS something new in determining the production trends of a factory at a glance, officials of the Boeing Airplane Co. at Seattle, Wash., have developed a unique chart which reveals past, current and anticipated future loads. The chart measures plant loads in terms of man-hours, summing up all projects for all shops on a master graph, as well as the same information for the plant's 13 individual shops on as many individual graphs.

Heretofore, officials and foremen found it necessary to refer to past, present and future orders in determining the trends of production. By means of the newly developed chart, however, they can readily see just what past trends have been, just what current projects involve and what preparations will be necessary in arranging for future work.

The master graph and the 13 individual graphs cover two and a half year periods, showing hours worked, overtime, time not used due to temporary layoffs or absences, and shop load according to authorized schedules. All the panels are removable so that changes may be made as necessary.



"Red-Wing" gear finisher with power tail-stock action

New Developments Increase Accuracy

by R. S. Drummond
President, National Broach & Machine Company

RECENT advances in the correction of gear teeth have made it possible to remove an amount of material hitherto considered impracticable, if not impossible. In fact, it is now economically practicable to remove all the distortion resulting from normal heat treatment. Lap life also has been materially extended and in certain instances from 500 to 1000 gears are corrected without effecting an error of more than 0.001 in. in the profile of the lap even though the chordal thickness of the lap teeth may be reduced as much as 0.030 to 0.060 in. Results of this kind have ceased to be achievements and are considered normal routine in the better equipped gear-manufacturing plants.

Correction of gear-tooth inaccuracies has been attempted by a variety of methods. The practice of running two gears together on parallel axes produced variation in wear at different points on the gear tooth surface. To overcome this objection, a modification of this method uses an oscillating motion parallel to the axes of the gears while they are being run together. This does increase the cutting action at all points on the tooth surface but, unfortunately, does not materially alter the difference in cutting effect already mentioned.

A further development of this idea was the introduction of a second motion, that is, one to vary the center distance between the gears in order to spread out the line of weakest lapping, which occurred on the pitch circle. This phase of gear lapping has reached its greatest development. Machines have been equipped even with a radio attachment which makes audible the sound of the gears as they are being run together. In this operation, lapping is halted by the operator as soon as the characteristic sound has diminished to a minimum and before it starts to increase again.

Under the above procedure the gears do assume conjugate shapes, but the tooth, when completely processed, does not have the form of an involute curve, nor is angular motion transmitted uniformly by the finished gears.

Another principal avenue of attack on this problem has been the use of a separate lapping element. This has resulted in increased lap capacity, as the material chosen for the lap is softer than the gear to be processed and is of such a character that it more readily holds the abrasive compounds. In fact, special lap materials increase the ratio of lap wear to gear wear about 20 to 1.

Worm Lapping Not Satisfactory

Worm lapping has been used to a limited extent in the recent past for automotive gears, but without significant success. This process depends too largely on the judgment of the operator. If continued too far, the work is seriously damaged. Set-up also proves troublesome, in that it is not possible to run the gears in their correct position until lapping is completed. The set-up has to be constantly adjusted and this has a tendency to throw serious variations in the tooth profile. These objections are intensified by the fact that high speeds are used and the cuts are taken lengthwise of the tooth profile.

Still another effort to solve the troublesome variation in the amount of cutting at different points on the gear tooth entailed the use of a master internal lap having the same number of teeth and profile as the work gear. The work gear is reciprocated inside this special lap, contacting first one side and then the other of its teeth. An intermittent indexing spreads excessive wear over the several lap teeth. The result of this type of lapping, however, shows little improvement in the eccentricity of the finished product. Any given lap rapidly assumes the characteristics of the average of the gears processed. If excessive error occurs in several consecutive pieces, the lap tends to take the same shape as the poorly proportioned work units.

Another objection to this means of correction is due to the lengthwise cutting on the gear teeth, which tends to produce a washboard effect and excessive noise in the operation of the completed product. It is also quite difficult to secure accurate master laps. The current practice in producing the lap is to cast it over a master gear and then run it into shape with a variety of selected gears. This practice eliminates the variation due to rolling contact with other gears but introduces a factor of excessive wear, as certain teeth of the lap are seriously scored.

Another variation in gear correction equipment is the use of the split worm lap which takes up backlash between the gear and lap while running on correct centers. This

*Paper presented at the spring meeting of the American Gear Manufacturers Association.

In Gear Lapping and Speed Production*

results in one half of the worm operating on one side of the tooth and the other half on the other side. The tendency of this action is to cut tooth profile rapidly, but at the sacrifice of angular correction.

The internal gear has been used also in another way, that is, allowing the work gear to roll with the lap. The resulting action successfully corrects tooth profile, but at the expense of machine time. Another obstacle to the use of the method is the difficulty of obtaining internal gears of the necessary size and accuracy.

Another method of gear correction relies on the use of a rack lap. The teeth of the work gear are parallel to the length of the rack teeth. This method corrects gear inaccuracies with relative success, except as to index error. Inasmuch as any given tooth on the work gear continuously contacts the same tooth on the rack, wear due to index error becomes cumulative. The initial cost of the rack and the cost of its accurate recutting also have proved to be serious objections.

With increasing pressure from the automotive industry for silent transmissions, it has become imperative for the gear manufacturer to eliminate all errors in gear teeth to a very much higher degree than was considered necessary heretofore. These errors include those of profile, index, eccentricity, helix angle and quality of finish.

These insistant demands for higher quality have resulted in two new lapping practices being developed within the last three years. Both are based on the use of a separate lap and a crossing of the axes of gear and lap. The first of these is known as "cramp lapping," in which the lap tooth is given an abnormal thickness and in which the feed reduces the center distance between gear and lap. The lap teeth contact both sides of the gear tooth, cutting being accomplished by a lapping compound fed into the gears during the operation.

Cramp lapping is very rapid and is an ideal means of correcting excessive eccentricity or index. It has become standard practice in a number of progressive shops manufacturing automotive gears. In explanation, let me say that any material change effected in the center distance between gear and lap is compensated for by a change in the angular setting of the axes, inasmuch as the lap and work gears mate in the same way as a pair of skew gears. This angular relation of the two axes is controlled by a vernier fixture on the machine column.

Although the worm lapping process was the first to use crossed axes, the angle between the axes in that process is approximately 83 deg. The new practice of crossed-axis lapping introduced in 1930 reduces this angle to less than 30 deg., and it frequently ranges below 10 deg. The angle used in any given case is the difference between the helix angle of the gear and that of the lap.

The results attained by these newer methods have been so sig-

Fig. 1 — Three-ring lapping

Fig. 2 — "Red-Wing" cramp action

Fig. 3—Lapping by means of sectional internal-tooth lap

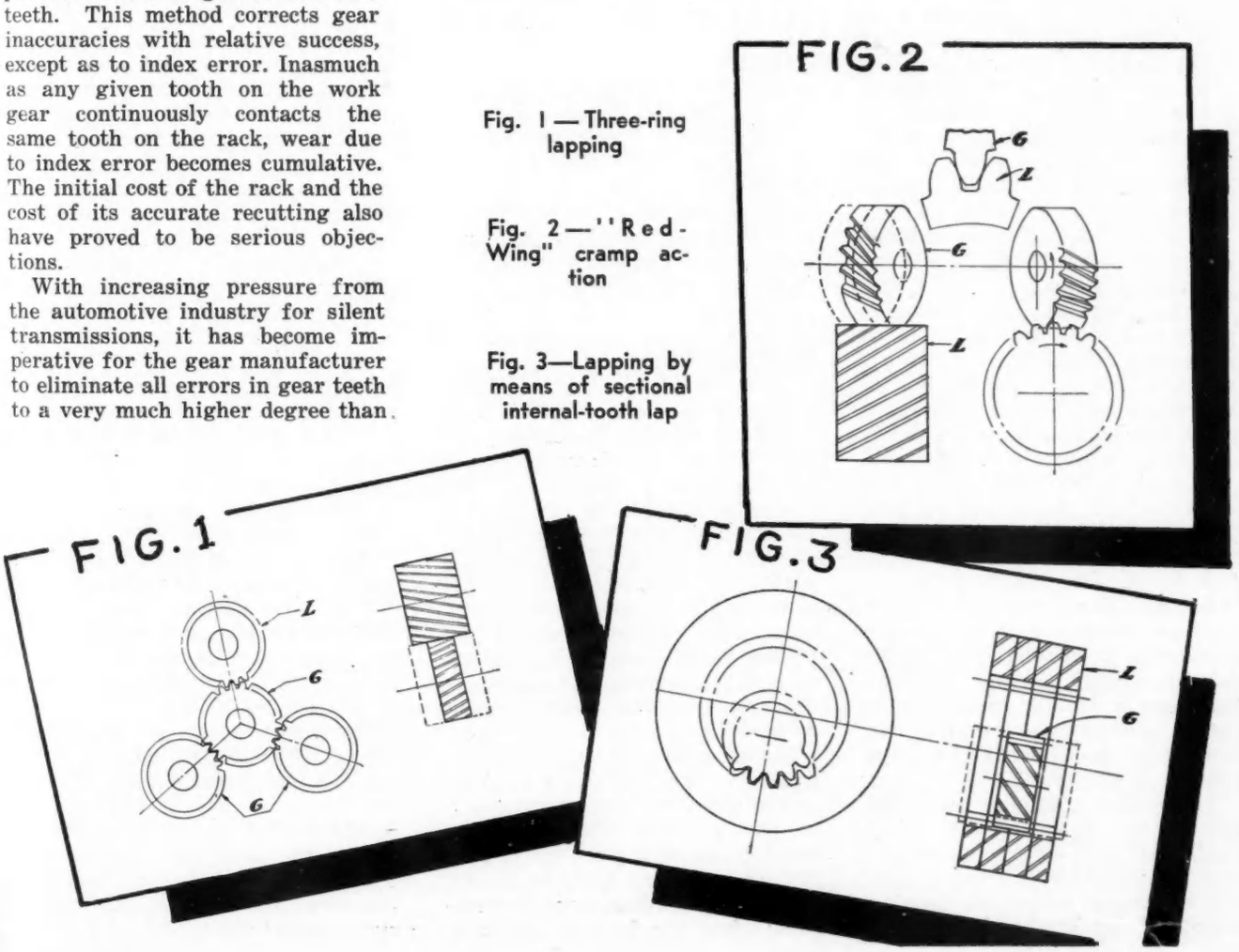


Fig. 4—Rack-lapping

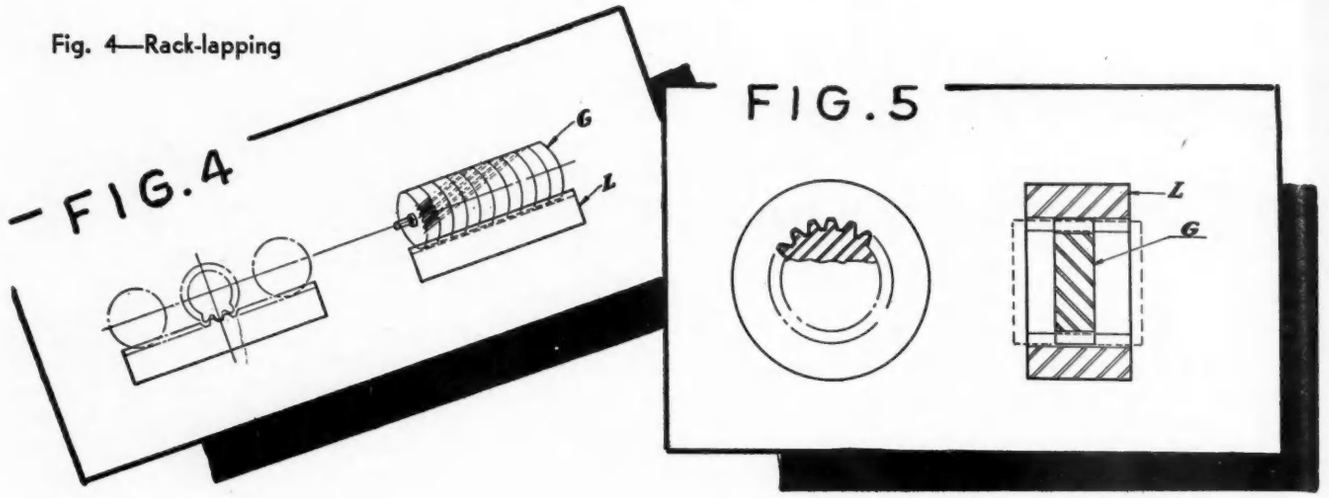


Fig. 5—Lapping by means of an internal-tooth lap

nificant that practically 75 per cent of the lapping tools purchased since their introduction incorporate the new principles. One outstanding case comes to mind of a set of gears having the following errors: Involute, 0.004; eccentricity, 0.005; cumulative index, 0.008; helical angle, 0.005 on a 3-in. radius. These gears were corrected to a final involute error of 0.0005; eccentricity, 0.001; cumulative index, 0.001; helical angle, 0.001 on a 3-in. radius. Although considerable material had to be removed to attain this result and backlash was considerably increased, it is an extreme example of what can be done by means of the newer lapping methods.

In the second of these methods, known as power-tail-stock lapping, the center distance between gear and lap remains constant and a power tail stock is used to effect a breaking action on the work gear, which is driven by the lap. After the work gear has been driven a given number of revolutions in one direction, rotation is reversed and continued in the opposite direction a number of revolutions to complete the cycle. The brake operates throughout the continuous cycle, first in one direction and then in the other. Thus both sides of each work-gear tooth are given the same amount of processing. As in the "cramp lapping" above described, the axes are crossed. In both methods an automatic electric reversing and timing mechanism controls the number of revolutions.

The cutting or lapping compound also has been given a great deal of study and has undergone remarkable improvement in recent years. By the improvement of lapping compound, lap life has been raised from approximately 100 gears to 500 and as high as 1000 in special cases. In a particular lap which was used for automotive transmission gears, the chordal thickness showed a total wear of 0.079 in. yet the variation in profile amounted to only 0.001 in.

Too much attention cannot be devoted to the proper choice and inspection of grain size and quality in a lapping compound. There is a vast difference in the character of individual grains in any given size material. For instance, grain specified for abrasive paper is quite unsatisfactory for gear lapping, because it contains a high percentage of needles and slivers. Grain for lapping compound should be of a rounded, irregular shape but never needle-like. Tests have proved the assertion that efficiency of cutting action and lap life can be greatly increased by a proper choice of grain and lubricant.

In our work we have used two lubricants, one an oil-soluble compound for washing in kerosene, the other a water-soluble compound for washing in oil or soda water. The same size and quality of grain are used in both, and the same amount of grain. Nevertheless, carefully conducted tests have shown the water-soluble compound to be very much more efficient than the one having the oil base. With one exception, all plants on our customers' list are using the water soluble compound.

Standard lapping time today for reasonably well-cut gears is about two minutes per unit, having a 1-in. face and 4-in. diameter. This assumes reasonable control of gear cutting and heat treatment. We have found in other shops that machine time for lapping gears of similar size amounts to as much as five minutes, and in still others, handling carburized gears inaccurately machined, machine time has amounted to as much as ten hours. Errors of this magnitude should be eliminated by adequate control of gear cutting and heat treatment.

One of the finest runs I remember was a lot of 30,000 gears. The rejection for gear noise after lapping was only 1 per cent, and the lapping time averaged one minute per gear. The lap life on this job was approximately 900 gears per cutting, and the lap was recut twice, which gave a total life of 2700 gears. These were standard automobile transmission gears of several well-known designs which were accurately cut and heat treated.

When excessive distortion occurs due to high-carbonized heats on large gears, it has been found very advantageous to take a single roughing cut with a grinding machine so as to remove this excess before final lapping.

In a recent test, in which the grinding time on 12 in. gears was 67 minutes, similar results were achieved by a single grinding operation of 15 minutes, followed by lapping for 6 minutes, a total time of 21 minutes.

In the lapping of oil-treated gears, the standard lapping time varies from one minute to 4 minutes on gears of 1-in. face and 4-in. diameter, and the proportional size of the gears indicates the increased lapping time required for the same cutting and heat treatment conditions.

S.A.E. Committee Presents Code of Size and Weight Limitations on Motor Vehicles

Proposals Are Less Restrictive Than Code of State Highway Officials — Asks 102-In. Width for Dual Pneumatics—Favors Weight Limits Based on Axle Load

NEW YORK—"Basing its recommendations entirely upon the facts of the case as established by published engineering research by qualified authorities," the Automotive Transport Code Committee of the S.A.E. this week presented its code of motor vehicle size and weight limitations. The new code differs in detail under every heading but one from the code of the American Association of State Highway Officials which has the endorsement of the N.A.C.C., the Joint Committee of Rail Executives and Highway Users, and others. The exception is in the matter of heights where both codes are in agreement that the maximum, unladen, should be 12 ft. 6 in. In general the S.A.E. code is less restrictive than the Highway Officials' proposals.

Load and Dimension Limitations on Motor Vehicles

CODE ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

1. **WIDTH**—No vehicle shall exceed a total outside width, including any load thereon, of 8 ft., except vehicles now in operation which, by reason of the substitution of pneumatic tires for other types of tires, exceed the above limit.

2. **HEIGHT**—No vehicle unladen or with load shall exceed a height of 12 ft. 6 in.

3. **LENGTH**—(a) No vehicle shall exceed a length of 35 ft. extreme overall dimension, inclusive of front and rear bumpers.

(b) Combinations of vehicles shall consist of not more than two units and, when so combined, shall not exceed a total length of 45 ft.

(c) The truck tractor and semi-trailer shall be construed to be one vehicle for the purpose of determining lengths.

(d) For occasional movements of materials or objects of dimensions which exceed the limits herein provided, a special permit shall be required.

4. **SPEED**—(a) Minimum speed. No motor vehicle shall be unnecessarily driven at such a slow speed as to impede or block the normal and reasonable movement of traffic except when reduced speed is necessary for safe operation or when a vehicle or a combination of vehicles is necessarily or in compliance with law proceeding at reduced speed.

(b) Maximum speed. No bus or truck shall be operated at a speed greater than 45 miles per hour. Passenger automobiles may be operated at such speeds as shall be consistent at all times with safety and the proper use of the roads.

(c) Vehicles equipped with solid rubber or cushion tires shall be operated at a speed not in excess of 10 miles per hour.

5. **AXLE LOAD**—(a) The wheels of all vehicles, including trailers, except those operated at 10 miles per hour or less, shall be equipped with pneumatic tires.

(b) No wheel equipped with high pressure, pneumatic, solid rubber or cushion tires, shall carry a load in excess of 8000 pounds, or any axle load in excess of 16,000 pounds.

Research indicates that low pressure pneumatic tires can carry 9000 pounds per wheel without increasing pavement slab stresses.

An axle load shall be defined as the total load on all wheels whose centers may be included between two parallel transverse vertical planes 40 inches apart.

(c) These limitations are recommended for all main rural and inter city roads, but should not be construed as prohibiting heavier axle loads in metropolitan areas if any State desires.

(d) These weight specifications for wheel and axle loads may be restricted by the State Highway Department for a reasonable period where road subgrades are materially weakened from thawing after deep frost or from a continued saturated condition of the soil.

6. **GROSS WEIGHTS**—Subject to the limitation imposed by the recommended axle loads no vehicle shall be operated whose total gross weight, with load, exceeds that given by the formula $W=c(L \text{ plus } 40)$ where

W=total gross weight, with load, in pounds

c=a coefficient to be determined by the individual States

L=the distance between the first and last axles of a vehicle or combination of vehicles, in feet

A value of 700 is recommended for "c" as the lowest which should be imposed but this should not be construed as inhibiting greater values.

(Note): This gross weight recommendation is particularly applicable to bridges since axle loads and length limitations are determinative in their practical application.

CODE RECOMMENDED BY THE S.A.E. AUTOMOTIVE TRANSPORT CODE COMMITTEE

1. **WIDTH**—The maximum body width shall be 96 in. The maximum width over dual pneumatic tires measured on a line through the center of the hub, parallel to the ground, shall be 102 in.

2. **HEIGHT**—The maximum height shall be 12 ft. 6 in. when the vehicle is unladen.

3. **LENGTHS**—(a) **Classification of Vehicles**—Classification of single units for separate operation or for operation in combinations.

(1) Motor Truck. (A single self-propelled unit carrying its own load.)

(2) Tractor-truck. (A single self-propelled unit provided with a fifth-wheel for a semi-trailer and with or without a body for carrying its own load.)

(3) Semi-trailer. (A unit drawn by a tractor-truck by means of a fifth-wheel connection.)

(4) Trailer. (A unit drawn by a truck or tractor-truck and entirely sustaining its own load.)

(b) **Single Units**—The maximum length for any single unit shall be 35 ft.

(c) **Combinations of Units**—

(1) The maximum length of a combination of vehicles on all classes of thoroughfare 20 ft. wide or less, shall be 45 ft.

(2) The maximum length of all combination of vehicles on all classes of thoroughfares more than 20 ft. wide shall be 65 ft.

(d) **Special Equipment**—For single units over 35 ft. long and for multiple unit combinations of vehicles over 65 ft. long, special permits good for not over one year, shall be required.

(e) **Number of Units**—The minimum (or least) maximum number of units to be operated in any one combination of vehicles, shall be two.

4. **WEIGHTS** — (a) **Definitions of Thoroughfares**—

(1) Streets—Thoroughfares within municipalities and immediately contiguous metropolitan districts.

(2) Highways—Main arterial routes between cities and towns and connecting industrial areas.

(3) Roads—all others.

(b) **Weight Limitations** — The minimum (or least) maximum axle weight limitations in pounds, in lieu of limitations in gross weight and inch width of tires, shall be

	Streets (1)	Highways (2)	Roads (3)
High pressure pneumatic	22,500	18,000	16,000
Balloon type tires.....	22,500	20,000	18,000
Solid tires (See Note 1)..	22,500	Not allowed	Not allowed

Note 1—Upon adoption of these weight regulations no new vehicles equipped with solid tires shall be registered and/or licensed for operation on Roads or Highways.

The FORUM

Should We Go Back to Arched Door Frames?

Editor, AUTOMOTIVE INDUSTRIES:

Recent criticism directed at the low entrance way at the door openings and the limited vision in some of the newer designs of closed bodies has been fair in the main, yet it must not be forgotten that there are differences in respect to these features in the latest designs and that it is usually possible for a customer to get what he wants if he shops around a little. There is another angle to this subject, and that is that any change from what we have been accustomed to is apt to rouse our opposition. I know personally of a man who, when taking delivery of a new car, complained that he could not see the right fender from the driver's seat, yet a year later, when asked if he had found the matter as important as he had believed it to be, replied he never thought of it.

Referring to Fig. 1, dimension C, from the floor to the roof at the center of the car, was formerly made 58 in., and this standard was adhered to for a long time, particularly by Brewster. Gradually, however, it had to be reduced to conform to the general trend in design. Today this dimension is never made more than 48 in. That car manufacturers were sensitive to criticism of insufficient entrance height is shown by the fact that two manufacturers at least, Packard and Pierce, arched the rear doors of their closed bodies as shown by the curved line in Fig. 1.

Body designers know the dimensions required for the comfort of the occupants when seated and also for comfortable entry, and they are loath to depart from them, but we must not overlook the tremendous pressure that has been brought to bear for years on both body and chassis designers to reduce the height of cars.

Back in the early days we had an underslung car that was very low, and sport models generally were built low, but then the bodies were mostly of the open type and one could "fall" into them. With a closed body the drip molding at the lower edge of the roof forms a barrier, and if this is so low that in entering one must bend not only the body but also the limbs, assuming a crouching position, criticism of the design is justified—unless it be a sport model. Of course, the very wide doors which prevail today are a great help in entering these low bodies.

We seemed unable ever to reach the low appearance that was desired by the public, as interior dimensions required for comfortable seating set a limit. The elbow line, which forms the lower line of the window opening, was raised, and simultaneously the top line of the window opening was dropped, thus increasing the roof thickness. Every expedient that tended to give an appearance of lowness had been seized upon, and yet the average value of dimension D remained approximately 68 in.

Then came the double-drop frame and D decreased to 64 in. in some cases. Interior dimensions remained reasonable, but the lowering of the frame side rail due to the double drop decreased the entrance height by approximately 4 in., and it was this change that called forth protests.

The standard dimensions for the driver's seat by which body designers are guided are shown in Fig. 1. In Fig. 2 a man 5 ft. 8 in. tall is shown in the driver's seat, which latter is laid out in accordance with the dimensions shown in Fig. 1. The dimensions indicated by letters in the drawing are as follows: G, 18½ in.; H, 17 in.; J, 20 in., while the person is standing but less when seated. This gives 29 in. from the eye down to the top of the depressed seat cushion and 7 in. to the back cushion, as indicated in Fig. 1. K is made 12½ in.; L, 4 in.; M, 12½ in., and N, 12 in. These dimensions apply to a man 5 ft. 8 in. tall when standing, and the height of the same person when seated is 29 + 4 = 33 in. This is the dimension from the depressed seat cushion to the top of the head.

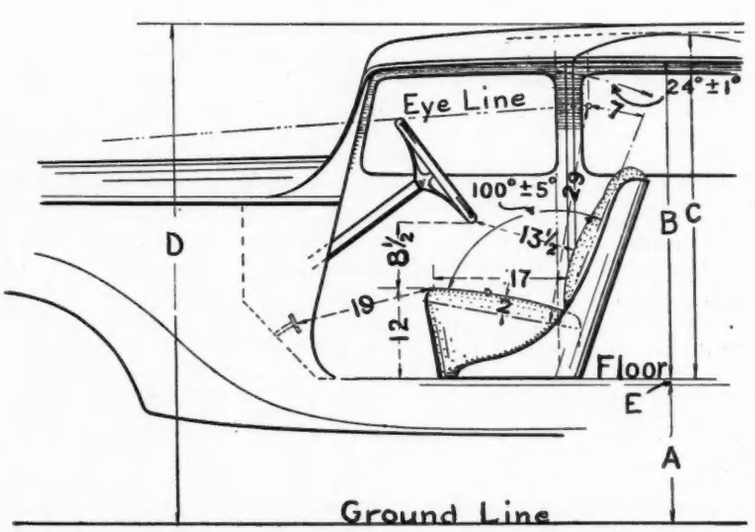


Fig. 1—Two car makers have arched their doors as shown here

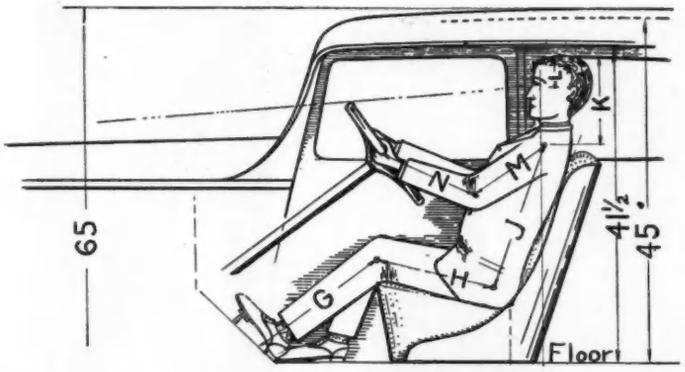


Fig. 2—In the low bodies the standard dimensions for seat are adhered to

It is customary to allow 37 in. between the depressed seat cushion and the roof, hence there is a clearance of 4 in. above the head of the driver. In the drawing the clearance is somewhat greater.

Differences in the heights of persons are due largely to differences in the lengths of limbs, the torso being fairly uniform in length. As all seats are now made adjustable, the dimensions here given are suitable for all persons except those of abnormal build, such as dwarfs. In Fig. 2, D is given as 65 in.; C, 45 in., and B 41½ in. The total height of the door entrance from the ground is 60 in., and a person 6 ft. tall therefore would have to stoop a minimum of 12 in. in entering. If the car is standing at the curb and the party is entering from the walk, he will have to stoop at least 6 in. more, the entrance height then being only 54 in. But, as pointed out previously, the very wide doors now generally fitted are a help in entering these low cars.

I wish it to be distinctly understood that I do not advocate the dimensions shown in Fig. 2; the object of this illustration is merely to show that even in the extremely low bodies the standard dimensions for comfortable seats are generally adhered to, and it is the low entrance way that is the chief cause for criticism.

The dimension designated by A in Fig. 1 really determines the height D. In the pioneer days of the motor car A was made from 25 to 27 in., as cars then had to be given sufficient clearance so they could pass over stumps and large rocks. Later the clearance was reduced and the standard for A remained at 21 in. for a good many years. In 1913 Pierce-Arrow adopted a double drop frame, which lowered the whole car, and to forestall any criticism with respect to insufficient entrance height, they arched the rear doors as indicated in Fig. 1. Thus, while the car as a whole was lowered, the entrance height at the rear door remained the same. Packard at about the same time, or somewhat earlier, took a similar step. At present some of the taxicab companies use these arched rear doors, which enables them to make C slightly less than the value commonly used for public service vehicles and still provide easy ingress and egress.

At present A is 17 in. in many cars with double-drop frame and the top of the floorboards is 1 in. above the frame (dimension E) in Fig. 1. The double-drop increases the kick-up at the rear, and in the low bodies the rear-seat cushion has to be made up with springs of less than the usual depth. Attempts have been made to overcome the difficulties with the rear seat in these low cars by increasing the forward overhang and moving the rear seat ahead so it clears the rear axle. This is doubly advantageous from the standpoint of riding comfort, for with the rear seat located between axles it naturally rides easier, and in addition it may then be provided with a full-depth cushion.

Reference was made in the foregoing to the practice of the Packard Motor Car Company in regard to body dimensions, and the writer obtained from A. L. Knapp, Packard body engineer, the following dimensions of present Packard seven-passenger bodies: A, 18 in.; B, 44½ in.; C, 48 in.; D, 70¾ in., with approximately 6 in. for the thickness of the roof, measured to the bottom of the drip molding. The entrance height from the ground is 70¾ — 6 = 65 in. approximately.

Every car manufacturer wants low appearance, and one of the expedients that have helped in this direction is thickening of the roof, by lowering the line at the top of the window and consequently the height of the door entrance. The practice of arching the top of the door as indicated in Fig. 1, which was adopted by Packard twenty years ago, is one way of combining low appearance with a reasonable door entrance height. In the past this has been confined to the rear door but there is no reason why it should not be applied to the front door as well.

—GEORGE J. MERCER.

Continuous Mechanical Transmission

Editor, AUTOMOTIVE INDUSTRIES:

A Swedish manufacturer of trucks and buses has developed a continuous mechanical transmission for use with a 100 hp. bus engine. This transmission cannot be heard or felt, and for certain purposes, such as railcar work, a device would be added which accumulates all of the energy of the car when the latter is brought to a stop. The energy thus stored up, less the friction losses (which are small), is then used for starting the car and accelerating it to nearly the same speed as that from which it was stopped. At this point the power plant takes up the drive.

One is inclined to believe that the fuel mileage would be materially increased by an accumulator of this type, especially in view of the fact that a somewhat smaller power plant would be satisfactory, because acceleration of the car is taken care of by the accumulator.

In services where there are frequent stops, the engine might be kept running during stops in order to store up more energy in the accumulator, which latter is of the purely mechanical type and could not well be used with any other type of gear. This would permit of reducing the size of the power plant materially without changing the schedule of the vehicle.

Stopping and starting as well as changes of gear ratio are controlled by the same lever. It would, of course, be possible to control the gear ratio by means of a vacuum cylinder and leave the rest to the mechanism.

HUGO K. MOREN,
Villa Skoghall,
Kristinehamn, Sweden.

Stettinius Chosen for Liaison Duties

Roper Names Sloan Head of Foreign Trade Relations Group of Council

WASHINGTON—Edward R. Stettinius, Jr., vice-president of the General Motors Corp., has been selected by the Industrial Advisory Board as its liaison officer with the National Recovery Administration. General Hugh S. Johnson, administrator, in announcing the selection of Mr. Stettinius said it marked another important step in the partnership between industry and the government in helping carry out the provisions of the new law. Mr. Stettinius has established his headquarters in Washington, occupying an office in the Department of Commerce building and will devote all his time to assisting the National Recovery Administration.

The Industrial Advisory Board, representative of the industry of the country, was recently appointed by Secretary of Commerce Roper to advise with the government on the administration of the Act. Among other members of the Board are Alfred P. Sloan, Jr., New York, president of the General Motors Corp.

Edward R. Stettinius, Jr. to assist Gen. Johnson

Mr. Stettinius was formerly in active charge of the Share-the-Work movement for the second Federal Reserve district.

Secretary Roper yesterday announced the appointment of Mr. Sloan as chairman of the Committee on International Trade Relations of the Business Advisory and Planning Council for the Department of Commerce. The Council was set up on June 26.

NE

Court OK's Durant Sale for $450,000

Purchaser of Lansing Plant Believed to Be Large Equipment Maker

DETROIT—Sale of the Durant Motor Co. plant at Lansing to the Lansing Manufacturing Co. for $450,000 was approved by Judge Edward J. Moinet in Federal Court here July 6. The bid was raised by $50,000 when creditors objected and demanded at least $500,000 for the huge plant.

Although the name of the real purchaser has been withheld, it is understood from reliable sources that the plant has been obtained by a large automotive equipment and parts manufacturing concern.

The plant was erected in 1921 and has been idle since December, 1931. It was thrown into receivership by the City Auto Stamping Co. of Toledo in January, 1932. The bid was submitted by R. H. Curtis, Detroit attorney, at Lansing on June 24, and has been increased three times, twice in Federal Court here and once at Lansing.

The Durant plant covers 43 acres of ground and consists of 21 buildings. The reproduction value is estimated at $2,250,000.

80.3 Per Cent of Passenger Car Production in First Five Months Wholesaled under $500

NEW YORK — Low-priced cars continue to dominate 1933 production, analysis of figures for the first five months showing that 80.3 per cent of of the cars produced during that period wholesaled for $500 or less. In the same period last year, this price class accounted for only 55 per cent of total output. As a result of the strength shown by the cars in the lowest-price bracket, all other groups show substantial reductions from 1932 in their shares of sales. A further consequence of the downward shift on the price ladder of public buying is that the only price class to show a gain is the $500 and under group, which has an increase of 62.5 per cent for the five months. Other groups show losses ranging from 44 to 72.4 per cent.

In the truck field, the distribution of business by capacities up to three tons does not show nearly as great variations from last year. Above the three-ton mark, the curtailment has been quite sharp, however.

Detailed comparative figures for both cars and trucks follow:

Passenger Car Production by Wholesale Price Classes
(First Five Months)

	1933	1932	Per Cent Change	Per Cent of Total 1933	Per Cent of Total 1932
Under $500	533,391	328,499	+62.5	80.3	55.0
$501-$750	96,290	171,942	−44.0	14.5	28.8
$751-$1,000	15,601	56,617	−72.4	2.3	9.5
$1,001-$1,500	10,255	27,367	−62.6	1.5	4.6
$1,501-$2,000	4,468	5,708	−21.5	0.7	1.0
$2,001 and over	4,534	6,348	−28.6	0.7	1.1
Total	664,539	596,481	+11.4	100.0	100.0

Truck Production by Capacities
(First Five Months)

	1933	1932	Per Cent Change	Per Cent of Total 1933	Per Cent of Total 1932
1½ tons and less	112,272	113,843	−1.2	93.6	92.7
2-3 tons	6,413	5,809	+10.5	5.3	4.7
3½ tons and over	971	2,519	−61.5	0.8	2.1
Ambulances, fire, buses	400	584	−31.5	0.3	0.5
Total	120,056	122,755	−2.1	100.0	100.0

WS

Retail Car Sales Reach New Peak as June Ends with 200,000 Estimated for Month

Most Producers Carry Banks of Unfilled Orders Into July Due to Material Shortages—Executives Expect Good July but Anticipate Some Seasonal Contraction

By Athel F. Denham
Field Editor, Automotive Industries

DETROIT — Reports received by factories from dealers on sales during the closing days of June indicate that the last week or ten days registered the best sales of any similar period so far this year and indicated a strong possibility that domestic sales for the month may exceed 200,000 passenger cars. Most producers have banks of dealers' orders on hand from June which will carry over well into July due to lack of materials. While sales executives are extremely optimistic as far as the July outlook is concerned, it is probable that the sales peak for the present has been reached and that July may show a decline in the neighborhood of 20 to 25 per cent.

June production for Chevrolet was the largest in two years, the total for the month being 81,573, as compared with 36,142 a year ago and 68,538 in May, 1933.

Dodge dealers in the week ending July 1 delivered 2866 Dodge cars and 692 trucks. Total deliveries by Dodge dealers, including Plymouth, were 5781. Shipments of Dodge cars during the week were the largest since August, 1926, and of trucks since September, 1929.

Deliveries of Graham cars in the week ending June 24 totaled 284, making it the best week so far this year. Robert Graham stated that indications pointed to further increases in July.

Retail Pontiac deliveries in June were ahead of any month since early 1930. Oldsmobile and Buick dealers' deliveries in June exceeded all months since April and May, 1931, respectively.

In the week ending July 1 Hudson-Essex sales recorded their fifteenth successive weekly gain. In the same week, Plymouth hung up a new high record for the ninth successive week. Plymouth shipments of roughly 41,000 for the month brought overall shipments for the first six months to 130,117, a gain of 76.5 per cent over the first half 1932 and 4.3 per cent ahead of entire year 1932.

Machine Makers Form "Super Association"

Production Equipment Groups Get Together for Cooperation Under National Recovery Act

CHICAGO—A "super trade association" for the machine manufacturing industry has been announced. It will be headed by John W. O'Leary of Chicago and will be known as the Machine and Allied Products Institute. The task of coordinating the activities of the various groups within the industry will be started and the problems arising in the industry through the application of the National Recovery Act will be immediately taken up for solution.

It is said that this new association will rank among the first five in the country in point of size. Practically all of the prominent manufacturers of machinery in the country, with a capital investment of approximately $3,500,000,000 and annual sales also approaching that figure, will be included in the membership.

The organization committee was headed by George H. Houston, president of Baldwin Locomotive Works. Other members were George Doubleday, Ingersoll-Rand Company; Max Babb, Allis-Chalmers Manufacturing Company; P. C. Brooks, Fairbanks, Morse Company; Paul Dewold, Brown & Sharpe; W. S. Elliott, Elliott Company; Max W. Pickering, Farrell-Birmingham Co.; P. E. Bliss, Warner-Swasey; Jacob Cox, Cleveland Twist Drill Company; Fred Grier, Cincinnati Milling Machine Company, and Philip Morgan, Morgan Construction Company.

Headquarters of the Institute will be established in Chicago.

W-R Markets Valve Lifter

CLEVELAND—The self-adjusting, hydraulic valve lifter developed by the Wilcox-Rich division of the Eaton Mfg. Co. and used on Pierce-Arrow cars during the past year has been made available to other car makers, it is announced by J. O. Eaton, chairman.

Active interest in the new product is being shown by a number of large motor car manufacturers. Engineers are reported to be actively interested in the new product, having started experiments for applying the valve lifter to some of the popular makes.

Bondholders Oppose Willys-Overland Plan

TOLEDO—Bondholders of the Willys-Overland Co. indicated Wednesday night that they will oppose the reorganization plan sponsored by the committee of which W. B. Stratton, New York, is chairman.

Creditors were scheduled to hold a general meeting Thursday to discuss the plan which has been approved already by their committee. It is believed they will generally assent.

Open hearing on the plan will be held July 10 in Federal Court.

The bondholders committee is headed by G. Munro Hubbard of J. G. White & Co., Inc., New York.

Chairman Stratton characterized the disposition of bondholders to oppose the plan as largely based on a trading attitude. He said the action was not unexpected.

Automotive Division Personnel Reduced

WASHINGTON—In the reorganization of the Bureau of Foreign and Domestic Commerce, Department of Commerce, the Automotive Division has been reduced in personnel from 13 to 5. A. W. Childs continues as chief of the division. It is understood that the Aeronautics Branch will be merged with the Automotive Division.

The Commodity Divisions throughout the bureau have been reduced until they are mere skeletons or entirely wiped out. It is reported that still other dismissals are in prospect. Employees let out will leave the Government service July 15.

Emory O. Penry

AUBURN, IND.—Emory O. Penry, vice-president of the Auburn Automobile Co. and a director of the Cord Corp., died here after a long illness on July 2 at the age of 49. Mr. Penry started with Auburn 22 years ago as automobile tester and subsequently became superintendent. Later he was made general manager of production for Auburn and its affiliated companies.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

The upward trend in general business has been progressing rapidly. Consumer buying continued upward last week despite the fact that this is the time of year when a slowing down usually occurs. Wholesale orders were also larger. Employment increased and further wage increases were reported in various quarters. The rapid spurt in buying has caught many manufacturers with low stocks, and in some cases orders are being filled with difficulty.

Freight Loadings Continue to Increase

Railway freight loadings during the week ended June 24, totaled 604,668 cars, which marks an increase of 16,737 cars above those during the preceding week, an increase of 106,675 cars above those a year ago, but a decrease of 154,695 cars below those two years ago.

Retail Sales on Upturn

Sales of store chains in the New York Federal Reserve district during May were only 3 per cent below those in the corresponding period last year, the smallest decline since February, 1932.

More Employment

According to an estimate made by the President of the American Federation of Labor, employment in the United States during April and May increased by slightly more than 1,200,000.

Price of Farm Products Up

According to the Department of Agriculture, the index of prices paid to farmers for agricultural products increased 2 points from May 15 to June 15. On June 15 the index stood at 64, with the pre-war average as 100, and compares with 50 on March 15.

Power Production Greater

Production of electricity by the electric light and power industry of the United States during the week ended June 24, was 10.9 per cent above that during the corresponding period last year.

Commodity Prices Rising

Professor Fisher's Index of wholesale commodity prices during the week ended July 1, stood at 65.1, as against 64 the week before and 63.5 two weeks before.

Stocks and Bonds Strong

The stock market last week continued the upward trend, under the stimulation of higher business levels, inflationary threats, rising commodity prices, and a further decline of the dollar on foreign exchange markets. There were moderate downward reactions from time to time, with the result that prices in general were irregularly changed for the week, although some special issues registered sharp gains. Trading was on an active scale and on two days surpassed five million shares. The bond market maintained strength during the entire week.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks during the week ended June 28, showed decreases of $31,000,000 in holdings of discounted bills and of $1,000,000 in holdings of bills bought in the open market. Holdings of Government securities increased $20,000,000. The reserve ratio on June 28, was 68.8 per cent, as against 68.5 per cent a week earlier and 68.3 per cent two weeks earlier.

Gasoline Consumption Expands in April

NEW YORK—Gasoline consumption in April amounted to 1,220,458,000 gal., a decline of 7 per cent from April, 1932, when consumption was 1,312,476,000 gal., the American Petroleum Institute reports. As compared with March, 1933, with a consumption of 1,115,240,000 gal., however, April showed a gain of more than 100,000,000 gal.

For the first four months of this year, total consumption was 4,338,149,000 gal. against 4,636,898,000 gal. in the same period last year, a loss of 5.7 per cent.

Illinois Truck Men Draw Up Recovery Plan

Working Hours, Wages, Rates Included. Suggest Conference With Executives of Railroads

CHICAGO — The Illinois Motor Truck Operators' Association has tentatively prepared for submission to Hugh S. Johnson, Recovery Act administrator, a program for stabilization of the motor truck industry.

In the letter accompanying the outline of the program, Walter E. McCarson, manager of the association, urged that a conference of rail and motor freight executives be held to draft a transportation policy. He also said that "legitimately operated trucking businesses are no threat to the railroads, while irresponsible truck operators who are offering cut rates, inadequate insurance, paying low wages," all of which results in an inability to earn enough to pay taxes, were threatening both railroads and legitimate truckers.

The program suggested contains the following main points:

1. Strict limitation of hours of work by truck drivers and maintenance of adequate wage scales.
2. Adequate financial responsibility of truck operators.
3. A 200 mile per day maximum limit of freight haul for any one driver.
4. Properly distributed fair tax to be devoted to maintenance of highways.
5. Uniform published rate schedule.
6. Adequate insurance laws.

Gorrell Heads Stutz Board of Directors

INDIANAPOLIS—Col. E. S. Gorrell, president of the Stutz Motor Car Co. of America, Inc., has been elected chairman of the board by the directors who, at the same time, reelected all other officers of the company. He succeeds Charles Reed as chairman. At the stockholders' meeting, all directors were reelected.

Ex-Cell-O Ups Wages

DETROIT—Ex-Cell-O Aircraft and Tool Corp. has announced an increase in wages from 5 to 10 per cent to 450 employees. All departments are working six days a week with some working seven days a week.

June production was 54 per cent ahead of May, the announcement said.

Commercial Credit Reports

NEW YORK — The Commercial Credit Co. and subsidiaries report that for the five months ended May 31, net income after interest, Federal taxes, minority interest, subsidiaries preferred dividend and other charges, amounts to $662,451.

Albert Russel Erskine

SOUTH BEND, IND.—Albert Russel Erskine, president of the Studebaker Corp., and long a prominent figure in the automotive industry, died by his own hand at his home here on July 1. He was 62 years old.

Mr. Erskine became treasurer and a member of the executive committee of Studebaker in 1911 and in 1915 assumed the presidency. Under his leadership, the corporation became a major factor in the industry, its production growing from 46,845 in the year he took the helm to a peak of 145,167 in 1923. Output continued well above the 100,000 mark through 1929. As the forces of depression gathered momentum, however, production declined to a low of 49,868 in 1932. On March 18, 1933, receivers were appointed for the company and since that date it is understood that Mr. Erskine has not been active in the management of the corporation.

Albert R. Erskine

In 1928, Mr. Erskine negotiated the purchase of Pierce-Arrow and in 1931 organized Rockne Motors which moves gave Studebaker distribution in the highest and lowest priced fields. A controlling interest in the White Motor Co. was obtained in 1932 but the actual merger with this company was blocked by minority interests.

Born in 1871 in Huntsville, Ala., Mr. Erskine's first important executive position was with the American Cotton Co. In 1904 he became treasurer of Yale & Towne Mfg. Co. and in 1910 vice-president of the Underwood Typewriter Co. A year later he joined Studebaker.

In a statement issued by the N.A.C.C., of which Mr. Erskine until recently had been a vice-president, director and member of the show committee, Alfred Reeves, vice-president, said:

"One of Mr. Erskine's outstanding contributions to the advancement of the industry was his support of the Albert Russel Erskine Bureau for Street Traffic Research which is conducted by Dr. Miller McClintock at Harvard University. Always a vigorous exponent of his viewpoint, Mr. Erskine was at all times a firm believer in collective activities towards the best interests of the industry."

Plymouth Again Breaks Weekly Sales Record

DETROIT—Retail sales of Plymouths during the week ending June 24, again broke all records in the history of the company, according to H. G. Moock, general sales manager, who stated that retail sales reported for this period totaled 6826 cars, an increase of 45.9 per cent over the same week a year ago.

Plymouth produced and shipped more cars during the first six months of 1933 than during the entire 12 months of last year—or any other year in the history of the company. Total output to date is 119,181 cars against 117,668 in all of 1932.

Motor Vehicle Heads Organize Conference

DETROIT—Uniform traffic regulations for the United States and Canada will be the major objective of the American Conference of Motor Vehicle Administrators formed at the closing session of a conference of motor vehicle commissioners held here last week. E. Austin Baughman of Baltimore was named temporary chairman.

Hupp June Best Month In a Year

DETROIT—Hupp Motor Car Corp. has reported retail deliveries during June were the largest in 12 months. Factory shipments were 18 per cent ahead of June, 1932, following a gain of 20 per cent in May over May, 1932. Indications are that July will show an appreciable increase over July of last year.

Approve Latrobe Purchase

DETROIT—At the annual meeting of stockholders of Whitman & Barnes, Inc., the plan to purchase the business and assets of Latrobe Tube Co. of Latrobe, Pa., was approved. The plan to change the capital stock to 300,000 shares of an authorized par value of $2.50 from 100,000 shares of no par stock was also approved. Exchange of stock will be made on a share for share basis. Directors were reelected at the meeting.

Third-Quarter Steel Prices Dispel Doubts

Represent No Advances over Prices Quoted by Independents in May

NEW YORK — Announcement of third-quarter prices by the leading interest's sheet-rolling subsidiary on Monday dispelled what uncertainty had been caused by many mills restricting bookings to July business, shipments to be completed by Aug. 15. The sheet prices announced: 2.25 cents, Pittsburgh, for No. 24 gage, hot rolled and annealed; 2.40 cents for No. 20 gage, cold rolled; and 2.60 cents for No. 20 gage autobody sheets, while denoting advances of $3 a ton over early May quotations, represent no fresh advance as "independents" had begun to name these price levels shortly after the middle of May.

Previous to announcement of third-quarter sheet prices, the heavy products subsidiary of the leading interest made it known that third-quarter prices for bars, plates and shapes would continue unchanged at 1.60 cents, Pittsburgh. The $26 per gross ton price of billets, slabs and sheet bars was also reaffirmed for third quarter. At the same time an "independent" announced an advance of $5 per ton in cold-rolled strip, bringing the new base price to 2.25 cents, Pittsburgh or Cleveland and 2.40 cents, Worcester.

Hot Rolled Strip Active

Hot-rolled strip for third quarter was advanced $1 per ton by another "independent," the new base price being 1.65 cents, Pittsburgh. All of these price changes have been followed by other producers and now constitute the market. Price adjustments so far effected during the initial stages of the Industrial Recovery Act's operation tend to show that the steel industry's leaders are much more bent upon attaining improved sales volume than precipitate price inflation. The Fourth of July suspension of mill operations in pleasing contrast with the last few years, was confined strictly to the one day.

Pig Iron—Blast furnace operations have reached the highest level in two years. Demand from automotive foundries continues encouraging. Prices rule steady.

Aluminum—Unchanged.

Copper—Under the influence of Monday's developments at the World Economic Conference, copper firmed and at the close 8½c to 9c was being asked by producers. Provided that the general economic trend continues as heretofore, a gradual advance to a level at which production can be put on a profitable basis is looked for.

Tin—In response to the further decline of the dollar in terms of Pound Sterling, spot Straits opened the week at 45⅞c, 1¼c higher than last week's close.

Zinc—Firm and unchanged.

Rail Act Assistance Offered by N. A. C. C.

Traffic Managers Get Reports on New Fixed Loading Device Tests

DETROIT—At a meeting of the automobile traffic managers, members of the National Automobile Chamber of Commerce, held June 29, it was voted to lend every possible assistance to Coordinator Eastman and the railroad committees in the administration of the Emergency Railroad Transportation Act for the rehabilitation of the railroads.

"Being one of the largest users of rail transportation," said J. S. Marvin, chairman of the conference, "our industry has a keen interest in the stability of railroads and the effectiveness of railroad services. We believe that shipping interests generally will do everything in their power to make a success of the new plans.

"While the act itself provides only for committees of railroad executives and labor representatives, those who use these services as represented in shipper groups will undertake to keep in close touch with plans as they develop.

"Reports on the experimental use of fixed loading devices in freight cars that will simplify the shipping of automobiles by rail continue favorable," continued Mr. Marvin. "Nearly two thousand freight cars have been equipped and for a number of months have been taking shipments satisfactorily to various parts of the country."

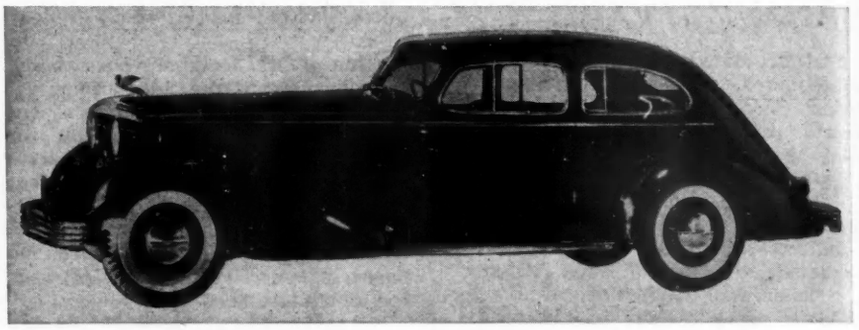
Other subjects considered by the meeting included the shipping of charged batteries with automobiles, which would be rendered much more expensive under a new ruling proposed by the railroads; freight rates on automobiles and trucks to the South and Southwest; carload minimum weight on shipments into Mexico, and the classification rating applied to a large number of automobile parts by the railroads.

Among those at the meeting were: V. Laird (Auburn); R. L. Reese (Buick); E. J. Tiedeman (Cadillac); C. R. Scharff (Chevrolet); C. A. Sullivan (General Motors); W. H. Lougheed (Graham-Paige); F. A. Allen (Hudson); E. N. Hodges (Hupp); E. A. Churchill (Lincoln); M. S. Graham (Reo), and R. R. Shultz (White), also K. A. Moore (N. A. C. C.), and J. S. Marvin, chairman of the conference.

Wayne County Up 11%

DETROIT—June registrations of new passenger cars in Wayne county totalling 7344, showed a gain of 11 per cent over last June and 17 per cent over May. All manufacturers showed gains over May except Auburn, Austin, Chevrolet, Oldsmobile and Packard, and of these Chevrolet and Oldsmobile were well ahead of June, 1932. Ford, while gaining 25 per cent over May, was still 38 per cent behind last June.

Truck registrations in June totaled 358, a gain of 50 per cent over May and of 2 per cent over last June. Dodge trucks moved into second place with 63 units to Ford's 157, and Chevrolet's 52.



Streamlined Fleetwood body on Cadillac V-16 chassis built for W. S. Knudsen, president of Chevrolet and vice-president of General Motors, which is now being displayed at the Century of Progress exhibition.

Ford Exchanging 650 Rebuilt Engines Daily

DETROIT—Ford Motor Company's engine reconditioning and exchange plan which has been in effect for past two months has developed to a point where about six hundred fifty engines per day are going through the Rouge plant. The great majority are four-cylinder engines on which the exchange price is $37.50 plus freight. On the eights the price is $40 plus freight with all prices slightly higher on West Coast. Reconditioning does not include accessories such as carburetor and electrical units, but exchange plans have been worked out for these also at a low cost.

Many dealers have acquired a bank of reconditioned engines so that they can be exchanged like batteries in service, it is reported by Ford Motor Co. Manifolds and cylinder heads are removed by dealer before shipment to Rouge plant for reconditioning.

Franklin June Payroll Exceeds May by 5 Per Cent

SYRACUSE—The payroll of the H. H. Franklin Manufacturing Co. reached in June the highest monthly total within the current year. The June record exceeds by five per cent the May figure, which was the previous 1933 high mark. Approximately the same number of men were employed in June as in May, with, however, a slight increase in hours worked.

The payroll situation is an indication that business volume is being sustained, where in previous years it is normal to note a drop-off in June. The outlook for continuation of favorable levels through July is good, according to Franklin officials.

Conference Called to Form Truck Federation

Will Consider Fair Trade Code under Recovery Act for For-Hire Operators

CHICAGO—Formation of a national federation of truck associations is planned at a conference called to meet here on July 11. The call was issued by Henry C. Kelting, president, Truck Association Executives of America, and J. L. Keeshin, president, American Highway Freight Association, following a meeting held in this city on June 24, 25 and 26 at which representatives of about 35 truck associations outlined plans for a national organization and discussed the desirability of submitting codes under the National Industrial Recovery Act.

Each truck association has been requested to send two delegates with powers to form a national organization. One of these delegates is to be engaged in the business of hauling for hire, while the other may be anyone the association selects. Associations having no for-hire members will be entitled to but one delegate. Only those delegates in the for-hire business will be allowed to vote on code questions, as it is assumed that private truck operators will be subject to control by codes adopted by their own industries.

A committee of three, consisting of T. D. Pratt, New York State Motor Truck Association, Frank B. Caughlan, Missouri Truck & Terminal Association and J. L. Keeshin, has been appointed to draft a tentative code for submission to the conference.

Ford Adopts Resin Finish

DETROIT—Synthetic resin enamel finish for Ford cars and commercial vehicles has been adopted as standard in all Ford plants, according to the current issue of *Ford News*. The finish has been used on Ford commercial bodies for the past year and as finish for all colored wheels for about three years.

Armco Has New Deep Drawing Sheet Metal

CHICAGO—The development of a new kind of deep drawing sheet metal was announced by Dr. Anson H. Hayes, director of the research laboratories of The American Rolling Mill Co., at the convention of Engineering Societies held here.

The new metal is said to have many physical properties new to ferrous metals and of great importance to the metal stamping world. It may be drawn and spun, permitting manufacturers of pressed metal products to adopt still more intricate designs, it is stated, and it permanently retains its ductility and tensile strength, nor does tempering destroy its drawing qualities. In the manufacture of automobile bodies and other articles where it is essential that the surface be unimpaired, the new metal is claimed to be of exceptional value. When properly processed, tests are said to have shown it to be practically free from stretcher strains which mar the surface and cause rejections.

Commercial production of the metal will start shortly. The automotive industry and other users of high finish deep drawing sheets will probably be the first to have it made available to them.

David J. Post

HARTFORD, CONN.—David J. Post, one of the automotive industry's pioneers, died here on June 25 at the age of 72. Mr. Post was one of the founders of the Veeder Mfg. Co. and in partnership with the late H. W. Lester formed Post & Lester Co., one of the early automobile accessory jobbing firms with many branches throughout New England. He was also one of the organizers of the Motor and Accessory Manufacturers' Association and served as one of its early presidents.

N.A.C.C. Committee on Recovery Act to Meet

DETROIT—The N.A.C.C. Committee, headed by Donaldson Brown of General Motors, which is studying the relation of the automotive industry to the National Industrial Recovery Act, will meet again during the week of July 9. Meanwhile it is reported to be collecting data necessary for its report.

Forecast 49% Increase In Automotive Loadings

WASHINGTON—Loading of automobiles, trucks and parts in the third quarter of the current year is estimated at 54,048 cars, an increase of 49.1 per cent over those in the corresponding period of last year, according to reports made to the American Railway Association by the Shippers' Regional Advisory Boards.

Automotive Oddities—By Pete Keenan

Write us if you know an Oddity

OX-POWER TAXI CAB IN MADEIRA.
The streets of Funchal, Madeira, are paved with stones worn smooth and being wet most of the time, sleding is more comfortable than AUTO WHEELS.
A 5- AND 10-CENT STORE GIRL MARY CAMPANA, HOLDS THE WORLDS ENDURANCE RECORD FOR LIGHT PLANES.
MILO LETSCH AND HIS SON, BUILT THIS THREE WHEELER. IT CAN GO 60 MILES AN HOUR, AND RUNS 40 MILES TO THE GALLON OF GAS. THEY CLAIM IT IS THE ONLY SPRINGFIELD BUILT AUTOMOBILE.
GASOLINE IN AUSTRALIA COSTS THE MOTORIST 48 CENTS A GALLON. THE TAX ALONE IS 15 CENTS.
SLOW UP & HOOT
ROAD SIGN IN EAST AFRICA.

New S.A.E. Section Chairmen

Baltimore — Oscar B. Lewis, Ethyl Gasoline Corp.
Buffalo—Fred A. Cornell, Electro Devices Co.
Canadian—John Leslie Stewart, Canadian Automotive Chamber of Commerce.
Chicago—Harold Nutt, Borg & Beck Co.
Cleveland—Walter S. Howard, White Motor Co.
Dayton—Eugene C. Du Val, U. S. Army Air Corps.
Detroit—H. T. Woolson, Chrysler Corp.
Indiana—Herman E. Winkler, Schwitzer-Cummins Co.
Metropolitan—Walter S. Peper.
Milwaukee—Paul W. Eells, Le-Roi Co.
New England—Alfred W. Devine, Ass't. Registrar of Motor Vehicles.
Northern California — J. M. Evans, Associated Oil Co.
Northwest—Sherman Bushnell, Hedges Motor Co.
Oregon — Robert W. Mann, Isaacson Iron Works.
Philadelphia—O. M. Thornton, Titeflex Metal Hose Co.
Pittsburgh — Murray Fahnestock, Ford Dealer & Service Field.
Southern California — Charles H. Jacobson, Moreland Motor Truck Co.
St. Louis—John C. Cox, Wagner Electric Corp.
Syracuse — Carl T. Doman, Doman & Marks.
Washington—Clarence S. Bruce, Bureau of Standards.
Wichita — MacShort, Stearman Aircraft Co.

Gabriel Appoints Horton

CLEVELAND—John J. Batterman, president of the Gabriel Co. of Cleveland, announces the appointment of Ellsworth A. Horton of Detroit as merchandising manager in charge of sales and advertising. Mr. Horton has been engaged in dealer organization work for the past 18 years with such concerns as the Lee Tire & Rubber Company, Kelly-Springfield, Firestone and the Packard Motor Car Company.

A.C. of C. Reorganizes for Recovery Act

NEW YORK—The Aeronautical Chamber of Commerce at a meeting of the board of governors on June 30 adopted a reorganization plan designed to facilitate its work as the trade association representing the entire aviation industry under the provisions of the Industrial Recovery Act. Leighton Rogers was elected executive vice-president in charge of all activities of the chamber. He was formerly chief of the aeronautics division of the Bureau of Foreign and Domestic Commerce, in the Department of Commerce. Thomas A. Morgan, president of the chamber, made the announcement after the meeting.

N.A.D.A. Appoints Munn as Vesper's Assistant

ST. LOUIS—F. W. A. Vesper, president and executive head of the National Automobile Dealers Association, announces the appointment, by action of the association's executive committee of that body, of John O. Munn as assistant to the president and general manager, and as secretary of the association.

Mr. Munn will work at the St. Louis headquarters, but will spend much of his time in the field contacting dealers so that the national officers will at all times be conversant with local market conditions, and have the knowledge to make the association program constantly and practically effective.

Mr. Munn has disposed of his former interest in Toledo, where, as head of the John O. Munn Co., he has conducted a marketing service for automobile dealers. His associates in this enterprise will continue the Munn Marketing Service to subscribers without interruption.

Car Radio Sales Now Ahead of Home Sets

CHICAGO—More automobile radios than home sets are now being sold, the committee on automotive radio of the Radio Manufacturers' Association was told at a conference in Hotel Sherman. D. E. Foster of the United States Radio and Television Corporation, who revealed this fact, stated the situation was largely seasonal, but asserted greater efficiency and lower prices for sets have caused a definite upturn in sales. Standardization of sizes and parts is one of the aims of the committee.

F.W.D. Compiles Book of State Truck Regulations

CLINTONVILLE, WIS. — "Truck and Trailer Size and Weight Restrictions" is the title of a handbook being compiled by F. M. Higgins, research department of the Four Wheel Drive Auto Co. Intended for the use of truck and trailer operators, the book condenses size and weight regulations for each state in tabular form. All possible truck and trailer combinations are listed in a separate table, giving the total gross loads permissible with each combination.

May Retail Sales Better 1932 Mark

First Time Sales Have Exceeded Preceding Year Since Oct., 1929

DETROIT, Mich., July 2—Registrations of new passenger automobiles in the United States in May totaled 160,243, according to R. L. Polk & Co.

The total was 20 per cent greater than the 131,282 total in May, 1932, and 34.5 per cent greater than the 119,909 total in April, this year. May was the first month since October, 1929, in which registrations exceeded those in the same month of the previous year.

Registrations of new motor trucks in May totaled 20,925, the report said. The total was 11.9 per cent greater than the total of 18,696 in May, last year, and 20.9 per cent greater than the total of 17,301 in April, this year.

Samuel McCombe

DETROIT—Samuel McCombe, formerly vice-president of American Oil and Grease Corp., died suddenly June 23. Death, which came while he was driving his car, was due to heart disease. He was 57 years of age. Recently he has been connected with the lubrication department of the Ford Motor Co.

CALENDAR OF COMING EVENTS

SHOWS

Int. Assoc. of Show and Assoc. Managers, Chicago ..... July 24-25
Eastern States Exposition, Springfield, Mass. ..... Sept. 17-23
Natl. Assoc. of Motor Bus Operators, Chicago ..... Sept. 21-22
National Metal Exposition, Detroit ..... Oct. 2-6
Joint Trade Show, N.E.M.A., N.S.P.A., N.E.W.A. ..... Oct. 30-Nov. 4
New York Automobile Show, Jan. 6-13, 1934
Chicago Automobile Show Jan. 27-Feb. 3, 1933

CONVENTIONS

National Metal Congress, Detroit ..... Oct. 2-6

MEETINGS

Automotive Engine Rebuilders Assoc., Annual, Chicago ..... July 10-14
S.A.E. International Automotive Engineering Congress, Chicago Aug. 28-Sept. 4
American Chemical Society, Chicago Sept. 11-15
American Transit Assoc., Chicago Sept. 18-20
Natl. Safety Council, Chicago.... Oct. 2-6
National Metal Congress, Detroit. Oct. 2-6
American Petroleum Institute, Annual, Chicago ..... Oct. 24-26